

# ENVIRONMENTAL ISSUES AND OPPORTUNITIES IN THE CALIFORNIA – MEXICO BORDER REGION

Prepared in support of the  
*2005 Integrated Energy Policy Report Proceeding*

**STAFF PAPER**

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# EXECUTIVE SUMMARY

Mexico and the United States (U.S.) share a 1,956-mile border, the world's longest border between an industrialized and a developing nation. Sharing a mere 150 miles of the border, the region between California and Mexico is home to almost half the total population of the entire binational border.

Rapid growth between California and Mexico—in commerce, industry, and population—is affecting the region's water supply and water and air quality, as well as causing traffic congestion during border crossings. To satisfy the increasing energy demands associated with this growth and mitigate environmental effects, the region will need to consider several options, including the development of additional energy infrastructure.

After describing the existing environmental conditions in the border region, this white paper discusses current effects and future implications of energy use and infrastructure on the environment. It then explores opportunities to improve air and water quality, water use, and the transport of goods across the border through thoughtful energy policy and planning.

In addition, the paper identifies opportunities for the California Energy Commission (Energy Commission) to participate in the existing Border 2012 Framework, a binational program founded by Mexico and the U.S. following the La Paz Agreement. This agreement appears to offer California state agencies the opportunity to participate in a well-developed process in which working groups are already attempting to resolve many cross-border environmental and energy issues. The U.S. Environmental Protection Agency leads the effort in the U.S.

The agreement also serves as the legal basis for the two countries to cooperate on border environmental issues. It defines the border region as 100 kilometers north and south of the border itself. The region comprises two counties in California, San Diego and Imperial, and five municipios in Mexico: Tecate, Tijuana, Mexicali, Rosarito, and Ensenada.

## Public Process and Development of Staff Paper

This paper was developed as part of the Energy Commission's proceeding for the *2005 Integrated Energy Policy Report* under the direction of the Integrated Energy Policy Report Committee (IEPR Committee). The focus is on energy-related issues that are unique to the border region.

As an initial step, the IEPR Committee held a workshop in December 2004 in San Diego, California, attended by many parties who presented materials on border-related topics. Since then, the staff has met with numerous parties to develop this work, including Baja California government officials from the Comisión Federal de Electricidad (CFE) and the

Secretariat of Infrastructure and Urban Planning to understand the issues in the border region from Mexico's perspective and to request information in support of this analysis. Unfortunately, the staff has not obtained all of the information needed at the time of preparing this report; thus, the analysis is weighted more toward conditions and issues in the U.S and is based on materials and information received to date.

This paper, along with other papers and presentations, will be the subject of a second committee workshop, which is scheduled for May 18, 2005 in San Diego. An important goal of this second workshop is to discuss with the Mexican officials and others in attendance any information missing from the paper with the hope of obtaining the additional information and including it in the final border energy report scheduled for publication in July.

## **Preliminary Findings and Suggested Next Steps**

Through its public process, Energy Commission staff assessed the environmental issues and opportunities, providing the IEPR Committee with the following preliminary findings and suggested next steps.

### ***Air Quality***

Air quality in the border region violates most established ambient air quality standards in both the U.S. and Mexico for ozone and particulate matter. In addition, the Mexican area of the border also violates the carbon monoxide standards.

Based on the inventory data, the mobile source sector, in contrast to the power sector, is the dominant source of emissions and is likely to be the source for the majority of the improvements.

Although emissions from the electricity sector are relatively small compared to the mobile sector and other sources in the region, power generation facilities are generally easier to control because they are large, stationary, and well monitored. Cross-border emissions trading is an innovative way to improve air quality while providing for additional infrastructure development. A recent survey of managers of Mexican manufacturing plants identified overwhelming support for the concept of emissions reduction credit trading.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate air quality working groups and policy forums of the Border 2012 Framework. Such participation could offer the Energy Commission direct contact with U.S. and Mexican federal environmental agencies with the authority to effect changes related to other sources of air pollutants, particularly mobile sources, in the binational region.

- Evaluating the costs and benefits associated with cross-border emissions reduction credit trading between Mexico and California.

## ***Water Quality and Supply***

Given growing population and other trends, the region's need for water is increasing. Meeting this need is complicated, in part because of the region's reliance on previously surplus water supplies to meet its needs. For example, the region is reducing its use of Colorado River water as other users of the same water require more, to which they have a right. Faced with this reduction, water districts in the region have secured water transfer agreements, but at the cost of displacing water traditionally used for agriculture.

Existing and planned power plants in the region will compete with other uses for available water supplies unless they employ alternatives. Traditionally, electric generation facilities use large quantities of water, but new technologies allow these facilities to reduce consumption of water significantly, by as much as 90 percent. By using dry-cooling technology, zero-liquid discharge methods, or treated waste water, high quality water can be conserved for human consumption and agriculture. In addition, renewable generation technologies that use no water, such as wind energy and solar photovoltaics, could help to ensure the region's future energy and water needs are met. Low water-consuming geothermal power projects like the Salton Sea Unit #6 Project could also help the region meet its energy and water needs.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate water and energy working groups and policy forums of the Border 2012 Framework. Involvement in these groups will help implement a coordinated approach to improving water and energy efficiency. Involvement in the Framework forums may also result in coordinated renewable electricity generation strategies.
- In the interest of achieving California's Renewable Portfolio Standard (RPS) (which requires investor-owned utilities to increase the amount of renewable energy they procure by 1 percent per year toward a target of 20 percent renewables by the year 2017), considering the benefits of continuing to provide incentives for development of no- or low-water consuming renewable energy (solar photovoltaics, wind, and certain kinds of geothermal), which avoids effects on water supply or quality. One possible incentive could be extending the term of the Solar and Wind Energy System Credit (Senate Bill 17x2 Brulte, Chapter 12, Statutes of 2001-02, Second Extraordinary Session) beyond the current termination date of December 31, 2005.
- Promoting a water policy for power plants less than 50 megawatts (MW) similar to one adopted in the *2003 Integrated Energy Policy Report* for power plants 50 MW



and larger. The policy addresses alternative water supplies, cooling methods, and treatment of wastewater discharge aimed at conserving higher quality sources of water supply and protecting water quality. A related policy should be considered for industrial users (other than power plants).

- Coordinating with the California Department of Water Resources, water and energy utilities, the California Urban Water Conservation Council, the Association of California Water Agencies, and other key stakeholders to provide greater incentives for both water and energy conservation. The initial focus should be on those strategies that reduce both water and energy consumption and distribution system losses.
- Supporting the Salton Sea Restoration Plan by providing input to agencies and developers on ways to improve water use efficiency related to energy use, development, and facility operation as well as information on alternatives to water use in energy facilities.

### ***Transmission Lines and Natural Gas Pipelines***

Bulk electric transmission lines in San Diego County are currently operating at, or close, to capacity. New lines are needed to improve system reliability and access new sources of generation outside of San Diego Gas & Electric Company's (SDG&E) service area, including renewable energy resources. Expansion of the Imperial Irrigation District (IID) and Baja California electrical systems may be necessary to increase the power transfer capability to and from the San Diego region. For transmission lines that cross the border, binational regulatory circumstances pose unique challenges to developing adequate infrastructure.

If liquefied natural gas facilities are developed in Baja California, they will require new or expanded pipelines to deliver gas to markets in northern Mexico and the southwestern U.S. As with transmission lines, transborder pipelines face binational and sometimes disparate regulatory oversight.

Siting new transmission lines and natural gas pipelines will be challenging. These projects will encounter environmental and land use constraints, public opposition, and time-consuming approvals from a multitude of agencies on both sides of the border.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate infrastructure working groups and policy forums of the Border 2012 Framework. Doing so will allow the state to promote the Garamendi Principles for the planning and siting of electric transmission facilities and extending their applicability to gas pipelines.

- Working with key stakeholders to ensure the siting of needed cross-border transmission and pipeline facilities in an environmentally responsible, efficient, and timely manner.
- Supporting additional exploration of whether upgrades to CFE transmission lines and the lines interconnecting the SDG&E and CFE transmission systems could meet the same needs as the 500-kilovolt lines identified by the SDG&E Transmission Comparison Study Working Group.

## ***Transportation of Goods***

Since the North American Free Trade Agreement passed in 1993, cross-border trade between California and Mexico has increased substantially, resulting in significant traffic congestion at California ports of entry along the U.S.-Mexico border. Most cross-border trade, an estimated 98 percent, is transported by truck through three main entry points: Otay Mesa, Tecate, and Calexico East. In 1996, approximately 78 percent of the trade transported by truck through these three border crossings originated or was destined for locations outside of San Diego and Imperial counties, including marine ports in Southern California.

Trucks moving goods across the border are a major source of air pollution. Traffic congestion has increased the time trucks spend idling at border inspection stations, which is a major component of the mobile source emissions in the border region. In addition, trucks burn at least four times as much fuel as rail to move an equivalent amount of cargo. The capital costs of replacing older trucks and locomotives with newer models that are more efficient and cleaner or upgrading rail lines are major barriers to switching to cleaner fuels and moving goods by rail instead of by truck.

The California Department of Transportation and the Baja California Secretariat of Infrastructure and Urban Planning have planned a number of infrastructure improvements to reduce congestion and improve the flow of goods across the border. The U.S. Customs Service is implementing expedited inspections at border crossings, reducing the time that vehicles spend idling at the border. Widespread adoption of these changes will improve air quality and reduce fuel consumption.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate transportation-related groups and policy forums of the Border 2012 Framework. Being involved in these groups will enable better coordination among all stakeholders.
- Promoting more efficient trucks and locomotives, the use of ultra low sulfur diesel and alternative fuels, and transporting more cargo by rail to improve air quality and reduce petroleum dependence.

- Working with the Baja California Secretariat of Infrastructure & Urban Planning to share information regarding future transportation and goods movement projects including potential rail line and airport expansion and cargo processing at new ports on the West Coast of Baja.

# CHAPTER 1: AIR QUALITY

## Introduction

Air pollution does not respect national boundaries, and the air quality issues along the California-Mexico border region are amplified by political, economic, and social barriers. The California-Mexico section of the border is distinctly subdivided by geographic and meteorological boundaries into two binational air sheds: San Diego-Tijuana and Imperial County-Mexicali. Because these air sheds span the international border, neither government is able to address regional air quality problems unilaterally. It is of interest to both nations to cooperate on air quality issues.

This chapter discusses the current state of air quality and air quality policy in the California-Mexico border region. While these issues have been studied for many decades, recent political and scientific progress has opened opportunities for air quality improvements.

## Regulatory Framework

Many working groups and entities (both public and private) on either side of the border are engaged in ongoing efforts to influence air quality policy in the border region. Appendix A contains a summary of some of the more significant stakeholders and programs.

The current situation is a product of more than a century of discussions between the governments of Mexico and the U.S. Modern environmental cooperation essentially began with the signing of the La Paz Agreement in 1983. The agreement defined the border region as the area within 100 kilometers of the border, which remains the commonly used definition. The La Paz Agreement set out steps by which the two countries would "... agree to cooperate in the field of environmental protection in the border area on the basis of equality, reciprocity and mutual benefit."

The most significant aspect of the La Paz Agreement is that it gave the U.S. Environmental Protection Agency (EPA) and its Mexican federal counterpart, the *Secretaría de Medio Ambiente y Recursos Naturales* (SEMARNAT), the authority to coordinate directly on environmental issues. Since 1983, the two agencies have initiated numerous cooperative projects and working groups in an effort to quantify and address the environmental issues in the border region. The first of these was the Integrated Border Environmental Plan (Border Plan). The Border Plan consisted of six workgroups, each dedicated to a border-wide environmental issue. The Border Plan was criticized for apparently having few mechanisms for addressing public and local concerns.<sup>1</sup> In 1996 the Border XXI program was initiated, based on the previous Border Plan but also including strategies for public involvement, decentralized environmental

management, and interagency cooperation. The Border XXI California-Baja California Air Subgroup, for example, proposed to build on existing efforts to:<sup>2</sup>

- Develop air quality monitoring networks.
- Develop emissions inventories.
- Use models and strategies as tools to improve air quality.
- Promote air quality improvement strategies intended to serve as useful tools for local decision makers.
- Promote ongoing involvement of local communities.

In 2002 the border environmental framework was revised into its current form, the Border 2012 Framework. In response to the criticism of the earlier plans, the new plan was designed to incorporate much more significant public, regional, and local input into the process.

### ***Border 2012 Framework***

The Border 2012 Framework is a 10-year binational program based on the La Paz Agreement and founded by the EPA and SEMARNAT, in cooperation with the California Air Resources Board (ARB), the Mexican Secretariat of Health, the governments of all 10 border states, border air quality management districts and environmental agencies, and many other public and private stakeholders interested in border environmental policy. The program emphasizes a regional approach anticipating that local decision-making, priority-setting, and project implementation would best address environmental issues in the border region. Workgroup meetings are held to produce prioritized and sustained actions that consider the environmental needs of the different border communities.<sup>3,4</sup>

The Border 2012 Framework has three subgroups with direct influence on California-Mexico border air quality policy. The California-Baja California Regional Workgroup is a regionally focused group responsible for environmental issues along the California-Mexico border. The Environmental Health Border-Wide Workgroup is responsible for federal level interaction on all environmental issues along the border. Finally, the Air Policy Forum is responsible for specifically investigating air quality issues that have border-wide implications. All three of these workgroups or forums are co-chaired by one U.S. and one Mexican representative, and all have the authority to start task forces to address specific concerns. The California-Baja California Regional Workgroup, for example, has created two air quality task forces: one investigating the Imperial Valley-Mexicali air basin and another investigating the San Diego-Tijuana air basin.<sup>5</sup>

## Existing Environmental Setting, Issues, and Trends

The ARB, EPA, and SEMARNAT have each established allowable maximum ambient concentrations of air pollutants based on public health impacts, called ambient air quality standards. The air quality standards of all three governments are presented in Appendix B for side-by-side comparison and show that Mexico and the U.S. generally have similar ambient air quality goals. In some cases, the Mexican air quality standards are more stringent than those of either the U.S. or California. Mexican environmental policy, however, in general does not focus as much on air quality as U.S. policy does. This is at least partially due to the limited resources available and the greater importance of more pressing environmental needs such as potable water and sewage treatment.<sup>6</sup>

The Californian portion of the two border air sheds is designated as the San Diego County Air Basin and the Salton Sea Air Basin. It is useful to compare the current ambient conditions in these two air basins to each other, as well as to the ambient conditions on the Mexican side of the border. This analytical separation of the two border air sheds into four regions is necessary because the available data on the Californian side of the border is much more extensive, and mixing the available data from either side of the border would be misleading.

In California and the U.S. in general, an air basin is designated as "attainment" for a specific pollutant if the concentrations of that air contaminant do not exceed the applicable standard. Likewise, an air basin is designated as "non-attainment" for an air contaminant if that standard is violated. Using this attainment/non-attainment approach, the ambient data can be compared against the Mexican air quality standards. A region is considered "non-compliant" with the Mexican standard if an ambient measurement exceeding the specified standard was recorded in the 2000-2003 period.

Table 1-1 and Table 1-2 below show the California and U.S. federal designations for the San Diego County and Salton Sea air basins. The tables also show the theoretical compliance status of those two regions with Mexican ambient air quality standards, as discussed above. Ozone and particulate matter less than 10 microns in diameter (particulate matter) are in violation of nearly all standards in the region. Though nitrogen dioxide is in attainment of air quality standards, it is a precursor to ozone and is thus a pollutant of concern.

**Table 1-1**  
**Attainment Status: San Diego County Air Basin**

| <b>Pollutants</b>  | <b>California State</b> | <b>U.S. Federal</b> | <b>Mexico</b> |
|--------------------|-------------------------|---------------------|---------------|
| Ozone              | Non-Attainment          | Non-Attainment      | Non-Compliant |
| Particulate Matter | Non-Attainment          | Unclassified        | Non-Compliant |
| Nitrogen Dioxide   | Attainment              | Attainment          | Compliant     |
| Carbon Monoxide    | Attainment              | Attainment          | Compliant     |
| Sulfur Dioxide     | Attainment              | Attainment          | Compliant     |

Source: California Air Resources Board. California Ambient Air Quality Data 1980-2003, 2005 Data CD, #PTSD-05-020-CD. Sacramento, CA. January 2005.

**Table 1-2**  
**Attainment Status: Salton Sea Air Basin**

| <b>Pollutants</b>  | <b>California State</b> | <b>U.S. Federal</b> | <b>Mexico</b> |
|--------------------|-------------------------|---------------------|---------------|
| Ozone              | Non-Attainment          | Transitional        | Non-Compliant |
| Particulate Matter | Non-Attainment          | Non-Attainment      | Non-Compliant |
| Nitrogen Dioxide   | Attainment              | Attainment          | Compliant     |
| Carbon Monoxide    | Unclassified            | Unclassified        | Non-Compliant |
| Sulfur Dioxide     | Attainment              | Attainment          | Compliant     |

Source: California Air Resources Board. California Ambient Air Quality Data 1980-2003, 2005 Data CD, #PTSD-05-020-CD. Sacramento, CA. January 2005.

Though ambient carbon monoxide monitoring in the Salton Sea air basin shows violations of all three air quality standards in nearly all recent years, all of these violations occur at one monitoring station at the border crossing (Calexico-Ethel Street). These violations appear to be due to idling motor vehicles at the border crossing, and are not representative of the rest of the Salton Sea air basin. Because other monitoring stations in the Salton Sea Air Basin do not show ambient violations of either the state or federal carbon monoxide standard, both California state and U.S. federal governments classify the region as “unclassified,” that is, neither attainment nor non-attainment.

In recent years ambient monitoring on the Mexican side of the border region has increased because both the U.S. and Mexican federal governments want to clearly establish baseline ambient data in the region. Though the available data on the Mexican side of the border is limited, it is sufficient to allow similar comparisons of the Mexican

portion of the air basins. Table 1-3 and Table 1-4 below list the compliant/non-compliant status for Tijuana and Mexicali respectively, using the same criteria applied above to determine compliance with the Ambient Air Quality Standards (AAQS) of all three governments.

**Table 1-3**  
**2000-2003 AAQS Compliance: Tijuana**

| <b>Pollutants</b>  | <b>California State</b> | <b>U.S. Federal</b> | <b>Mexico</b> |
|--------------------|-------------------------|---------------------|---------------|
| Ozone              | Non-Compliant           | Compliant           | Non-Compliant |
| Particulate Matter | Non-Compliant           | Non-Compliant       | Non-Compliant |
| Nitrogen Dioxide   | Non-Compliant           | Compliant           | Non-Compliant |
| Carbon Monoxide    | Non-Compliant           | Non-Compliant       | Non-Compliant |
| Sulfur Dioxide     | Non-Compliant           | Compliant           | Compliant     |

Source: California Air Resources Board. *California Ambient Air Quality Data 1980-2003, 2005 Data CD*, #PTSD-05-020-CD. Sacramento, CA. January 2005.

**Table 1-4**  
**2000-2003 AAQS Compliance: Mexicali**

| <b>Pollutants</b>  | <b>California State</b> | <b>U.S. Federal</b> | <b>Mexico</b> |
|--------------------|-------------------------|---------------------|---------------|
| Ozone              | Non-Compliant           | Non-Compliant       | Non-Compliant |
| Particulate Matter | Non-Compliant           | Non-Compliant       | Non-Compliant |
| Nitrogen Dioxide   | Non-Compliant           | Compliant           | Non-Compliant |
| Carbon Monoxide    | Non-Compliant           | Non-Compliant       | Non-Compliant |
| Sulfur Dioxide     | Compliant               | Compliant           | Compliant     |

Source: California Air Resources Board. *California Ambient Air Quality Data 1980-2003, 2005 Data CD*, #PTSD-05-020-CD. Sacramento, CA. January 2005.

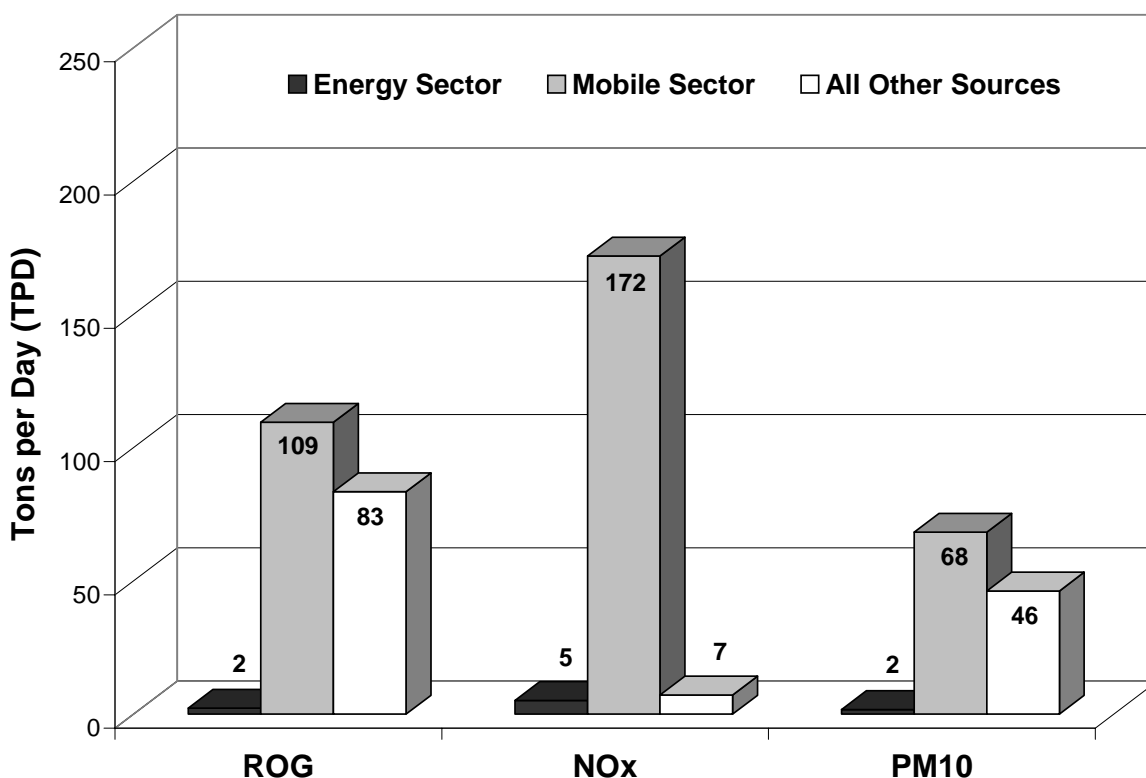
The carbon monoxide non-compliance in Mexicali carries over to the Salton Sea monitoring station on the border (Calexico-Ethel Street) and is caused by the same idling traffic at the border crossing. This emphasizes the cross-border influence of sources in the border region.



## Border Emissions Inventory

In order to critically address air quality issues in the region, it is necessary to understand the sources of the emissions. An emission inventory is an estimate of the average tons-per-day sum of all emissions in a region, which allows comparing the relative contributions of various industries or activities (called sectors). Figures 1-1 and 1-2 below present the respective San Diego and Salton Sea air basin estimated 2004 emission inventories for three pollutants: reactive organic gases (ROG), oxides of nitrogen ( $\text{NO}_x$ ) and particulate matter (PM10). Reactive organic gases and oxides of nitrogen are presented because both are ozone precursors. Both ozone and particulate matter are of significant concern due to the recorded ambient violations of standards discussed above. The emissions are presented in total tons of pollutant emitted in the basin on average each day of the year. Real emissions vary by day and season, but these average values allow comparison between sectors and regions.

**Figure 1-1**  
**San Diego 2004 Estimated Emission Inventory**

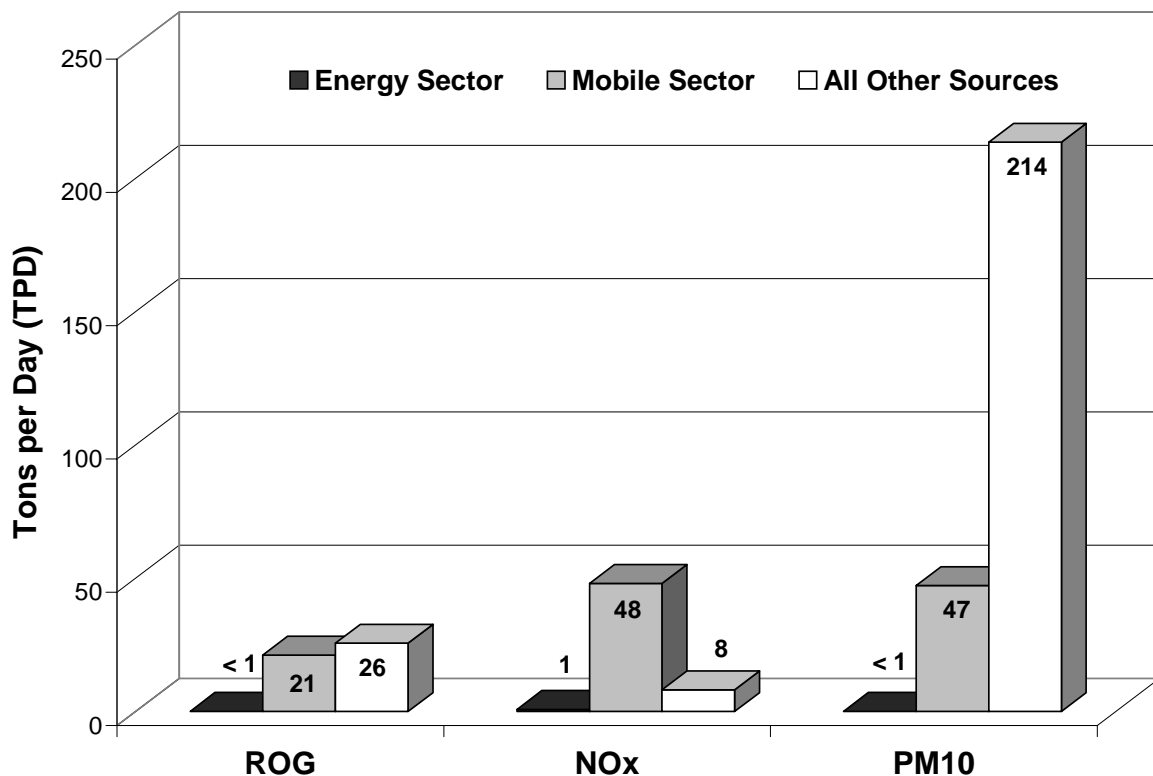


Source: California Air Resources Board. 2005 Almanac Emission Projection Data.  
[<http://www.arb.ca.gov/app/emsinv/emssumcat.php>]. Sacramento, CA. Accessed: March 2005.

Figure 1-1 above and Figure 1-2 below both highlight two sectors of the emissions inventory: energy and mobile. The energy sector is a combination of emissions from electrical generation and cogeneration facilities. This is contrasted with emissions from

the mobile sector, which are a combination of not only the direct emissions from all mobile vehicles (including passenger cars, light and heavy trucks, planes, ships, and trains), but also includes indirect mobile vehicle emissions from petroleum refining, fuel storage, refueling, and paved and unpaved road dust. The remainder of the inventory includes all other human made sources such as construction, landfill emissions, agriculture, consumer products and residential emissions.

**Figure 1-2**  
**Salton Sea Air Basin 2004 Estimated Emission Inventory**



Source: California Air Resources Board. 2005 Almanac Emission Projection Data.  
[<http://www.arb.ca.gov/app/emsmv/emssumcat.php>]. Sacramento, CA. Accessed: March 2005.

The Salton Sea Air Basin inventory presented in Figure 1-2 above also highlights the relative dominance of the mobile sector compared to the energy sector. The large other PM10 source contribution in the inventory estimate is due to the large amount of agricultural and rural unpaved roads in the region. It includes approximately 180 tons per day from agriculture and wind blown dust emissions resulting from wind erosion dust from unpaved roads while not in use. Subtracting those two sources leaves approximately 34 tons per day from all other sources, which is less than the total 47 ton mobile source particulate matter inventory.

This comparison shows that the mobile sector is the dominant contributor to emissions of reactive organic gases and nitrogen oxides, and is also a significant contributor to

particulate matter. Energy sector sources are not comparably large sources of these pollutants and are generally easier to control because they are large, stationary and well monitored.

## **Opportunities for Environmental Improvements**

Numerous air quality issues in the California-Mexico border region require attention, and many of these issues have already been or continue to be investigated in detail. The following overviews of two major border issues are examples of the issues that influence border air quality.

### ***Cross-Border Emission Reduction Credits***

Along the California-Mexico border there are opportunities to effect emissions reductions on the Mexican side of the border that may be both relatively inexpensive (on a cost per mass basis) and beneficial to the air quality on both sides of the border. One potential approach to address stationary sources is cross-border emission reduction credits, but this approach faces challenges.

The problem with cross-border emission reduction credits is management and enforcement. An emission reduction credit, as defined by the EPA, must represent a real, permanent, enforceable, quantifiable, and surplus reduction in air pollutant emissions. Emission reductions are considered real if they represent a reduction in actual emissions into the air. Emission reductions are considered permanent if they are assured for the life of the corresponding emission reduction credit through an enforceable mechanism such as a permit condition, revocation, or destruction of a source. Emission reductions are considered quantifiable if the amount, rate, and characteristics of the emission credit can be estimated through a reliable and reproducible method. Emission reductions are considered surplus if no local, state, or federal law, order, requirement, or regulation requires them.

Because of the complexities of binational policy management, it is difficult to establish all of the above criteria for a potential cross-border emission reduction. However, research in recent years has yielded significant progress. A study of *maquiladora*<sup>7</sup> management attitudes toward the concept of emissions reduction credit trading<sup>8</sup> found that 85 percent of respondents had never heard of the concept, but that once it was explained to them 96 percent indicated that their company would be willing to participate in such a program, if it were implemented. The following is a case study of a successful emission reduction credit effort in El Paso County, Texas.

## **Case Study: El Paso Electric Company**

In 2003 El Paso Electric Company was required to retrofit three natural gas boilers located at their Newman Station power plant or offset a portion of the oxides of nitrogen emissions from these boilers. El Paso Electric estimated that installing emissions reduction technologies on the three boilers sufficient to achieve the required emissions limit would cost approximately \$3 million. Due to lobbying by El Paso Electric, Texas law was changed (30 TAC section 101.337) to allow sources in El Paso to secure emission credits from reductions generated in Ciudad Juarez, directly across the border. Ciudad Juarez contained approximately 350 highly polluting brick kilns, which commonly burned wood, sawdust, tires, or other refuse as fuel to fire bricks. El Paso Electric worked with the Texas Commission on Environmental Quality to replace 20 of the brick kilns in Ciudad Juarez with cleaner Marquez design kilns. Based on testing by New Mexico State University using EPA methodology, each replacement resulted in approximately 3.3 tons per year of oxides of nitrogen credit.<sup>9</sup> The new kilns were more efficient than those that were replaced, the old kilns were dismantled, and El Paso Electric was required to provide annual reports documenting continued use. The reductions were shown to be real, permanent, enforceable, quantifiable, and surplus.

## ***Border Crossing Mobile Source Emissions***

There are numerous issues with direct impact on both border air quality and air quality policy that are exacerbated by the international boundary. The economic and political barriers of the border lead to behavior that can result in criteria pollutant emissions higher than would be expected for other regions with a comparable population. In addition, the projected rapid population growth in the region means that these types of environmental issues will likely be exacerbated over time. One example of this is the traffic congestion at border crossings.

Because of security and trade restrictions on traffic as it crosses the border, vehicles can be forced to wait significant periods of time at the crossings. In addition, recent trade agreements have steadily increased the mass transport of goods across the border, usually via heavy duty trucks, and such trade is projected to increase. Heavy duty trucks are known to emit relatively large quantities of criteria pollutants per mile, especially particulate matter and the ozone precursors, oxides of nitrogen and reactive organic compounds. Given noncompliance in the region with existing particulate matter and ozone standards, this is of particular concern. Further, these trucks usually refuel in Mexico, with fuel that can contain many times the amount of sulfur as fuel sold in California.<sup>10</sup> Mobile source emission reductions are a difficult problem to address and with the added issues associated with binational conditions, difficulties addressing mobile source emissions are exacerbated. At this time, options to reduce mobile source emissions in the border region need to be further explored.

## Conclusions

Air quality in the border region violates most established ambient air quality standards in both the U.S. and Mexico for ozone and particulate matter. Recent monitoring efforts, though limited, seem to indicate that ambient carbon monoxide levels on the Mexican side of the border also violate established standards. Analysis of the available inventory data indicates that the mobile sector is the dominant source of emissions. Because of the large contribution of the mobile sector to the regional inventory, control of mobile emissions in the border region would be an effective way to improve air quality.

Though progress has been made over the past decade, it has focused on organization building and data acquisition, and many border-specific air quality problems remain to be solved. The existing Border 2012 Framework led by the U.S. and Mexican federal environmental agencies appears to offer an opportunity for California state agencies to build on an existing and well-developed infrastructure. Active involvement in this existing effort would benefit from the prior communication between not only the local and federal governments of the two countries, but also the many non-governmental stakeholders in the region. This framework is the result of decades of organizational efforts and already involves a majority of interested stakeholders. Because border air quality management and policy are in essence federal-level issues between two sovereign governments, participation in this existing framework would give state government agencies direct contact with the federal policy makers necessary to effect changes in the binational region.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate air quality working groups and policy forums of the Border 2012 Framework to develop workable strategies to reduce emissions from mobile sources in the region while maintaining necessary security controls at border crossings.
- Evaluate the costs and benefits associated with cross-border emissions reduction credit trading between Mexico and California.

# CHAPTER 2: WATER QUALITY AND SUPPLY

## Introduction

Water quality and supply issues associated with existing and planned energy infrastructure along the U.S.-Mexico border could adversely affect the region's ability to secure sufficient water to meet residential and agricultural needs. Current supplies are already stressed. Rapid population growth continues in the border region and is projected to increase by 2.4 million by 2030, equating to a need for additional water supplies (through new sources or conservation) of at least 400,000 acre-feet per year (AFY).

In this arid region there are no new significant sources of fresh water supplies anticipated from either development within or import opportunities. Therefore, future water shortages may occur during drought conditions from two of the primary sources to this region, the Colorado River and State Water Project. If drought conditions similar to 1977 were to be repeated, the California Department of Water Resources projects State Water Project deliveries could be cut to 20 percent of the primary contractual supply. Compounding the picture is the recent cutback in California's supply from the Colorado River after nearly 50 years of reliance on surplus water supplies of as much as 1 million AFY above California's normal entitlement of 4.4 million AFY. These factors are leading to a growing reliance on sources of lesser quality and higher cost, such as desalinized seawater, and/or sources having important long-term consequences, such as transferring water derived from fallowing once-productive agricultural lands. The challenge is to find mutually viable options for California and Mexico that meet the region's energy needs, and preserve limited water supplies for the most fundamental and beneficial uses, while promoting economic growth and environmentally sound practices.

Although technically outside of the border region as defined by the La Paz Agreement, water issues in Riverside County are included in this discussion because the county's water supplies are integrated and co-dependent with the border region's water supplies. While availability of water quality and supply information is somewhat limited for Mexico and more readily available for California to support this assessment, together they provide a foundation to help understand the regional issues related to meeting energy needs in an environmentally responsible manner. Key to achieving this objective will be regional coordination to facilitate improved efficiency of water use and the development of more renewable energy resources that consume no or little water, including wind, solar, and certain kinds of geothermal resources. The relationship between energy and water systems, management, and use are being addressed concurrently in this proceeding in the Water Energy Relationship study. Analysis and recommendations specific to this relationship will be developed and incorporated in the final border energy report.

# Regulatory Framework

## ***Agencies and Groups Involved in Border Water Policy/Issues***

The following agencies and groups are involved in border water policy and issues:

- U.S. Department of Energy – Lead federal agency for approving transmission lines between Mexico and U.S.
- Secretaria del Medio Ambiente y Recursos Naturales (SEMARNAT), or Secretariat of Environment and Natural Resources – Mexico's government agency with primary responsibility for developing and implementing policy and regulations relating to natural resource management and environmental protection.
- Comisión Federal de Electricidad (CFE) – Mexico's sole entity in charge of providing power as a public service.
- California Regional Water Quality Control Board, Colorado River and San Diego Regions – Entity that establishes water quality objectives and oversees General National Pollutant Discharge Elimination System Permits for discharge of stormwater associated with construction and industrial activity and issues site-specific Waste Discharge Requirements or permits for discharge of waste to water or land.
- San Diego County Water Authority – Agency representing water purveyors in San Diego County that can be affected by power plant water use.
- Imperial Irrigation District (IID) – Water purveyor, holder of California's largest Colorado River water entitlement, and a participant in the Quantification Settlement Agreement, including the Salton Sea Restoration.
- Salton Sea Authority – Agency that represents local government in the restoration and management of the Salton Sea.
- San Diego State University – Provider of research on numerous environmental issues related to border region energy and resource issues.
- Border Power Plant Working Group – Advocate for renewable energy development.
- Sierra Club – Promoter of environmental protection and advocate for renewable energy.

## ***Agreements and Treaties***

The following form the foundation for cross-border interaction:

- La Paz Agreement – This agreement defines the border region as 100 kilometers, approximately 60 miles, on both sides of the border, encompassing all of San Diego and Imperial Counties. It also establishes the 2012 Border Working Group.
- Kyoto Protocol on Climate Change – Mexico ratified this treaty, while the U.S. did not. Although Mexico is not an Annex 1 country, which means it does not have any air emission reduction commitments, it may benefit from investment from countries that are considered Annex 1 such as the European Union, which has countries looking to invest in Mexican renewable projects, particularly wind power.



## Existing Environmental Setting, Issues, and Trends

### *Water Supply Sources in the Border Region*

The quantities of primary water supplies serving the border region, expressed in AFY, are summarized as follows:

**Table 2-1  
Primary Water Resources Serving or Projected to Serve the Border  
Region in Normal Years (AFY)**

| Entity                                   | Colorado River Entitlement        | Colorado River Water Transfers                              | State Water Project | Other            |
|--|-----------------------------------|---|---------------------|------------------|
| Palo Verde Irrigation District (PVID)    | 420,000                           | -111,000<br>(to MWD)  | 0                   | 0                |
| Yuma Project                             | (included with PVID's allocation) | 0   | 0                   | 0                |
| Imperial Irrigation District (IID)       | 3,100,000                         | -413,000<br>(to CVWD, MWD & SDCWA)                          | 0                   | 0                |
| Coachella Valley Water District (CVWD)   | 330,000                           | + 103,000<br>(from IID)                                     | 156,100             | 14,300           |
| Metropolitan Water District (MWD)        | 550,000                           | + 221,000<br>(from PVID & IID)<br>-77,700<br>(Canal Lining) | 1,780,000           | 850,000          |
| San Diego County Water Authority (SDCWA) | (included with MWD's allocation)  | + 200,000<br>(from IID)<br>+ 77,700<br>(Canal Lining)       | 225,000             | 250,000          |
| <b>California Subtotal</b>               | <b>4,400,000</b>                  | <b>0</b>  | <b>3,566,000</b>    | <b>1,114,300</b> |
|  |                                   |   |                     |                  |
| <b>Mexico</b>                            | <b>1,500,000</b>                  | <b>0</b>  | <b>0</b>            | <b>N/A</b>       |

Sources: 11, 12, 13, 14, 15

Notes: 1) Several of the Colorado River Entitlements are based on water needed to irrigate or serve a specified area of land within the service areas of the districts. In the case of Imperial Irrigation District and Coachella Valley Water District, their entitlements were quantified as a result of the Quantification Settlement Agreement (QSA).

2) Water quantities shown under Colorado River Water Transfers are not all effective immediately and will take years before fully implemented.

## Colorado River

The primary entities in California served by Colorado River water are as shown in Figure 2-1 – California Service Areas.

**Figure 2-1  
California Service Areas**

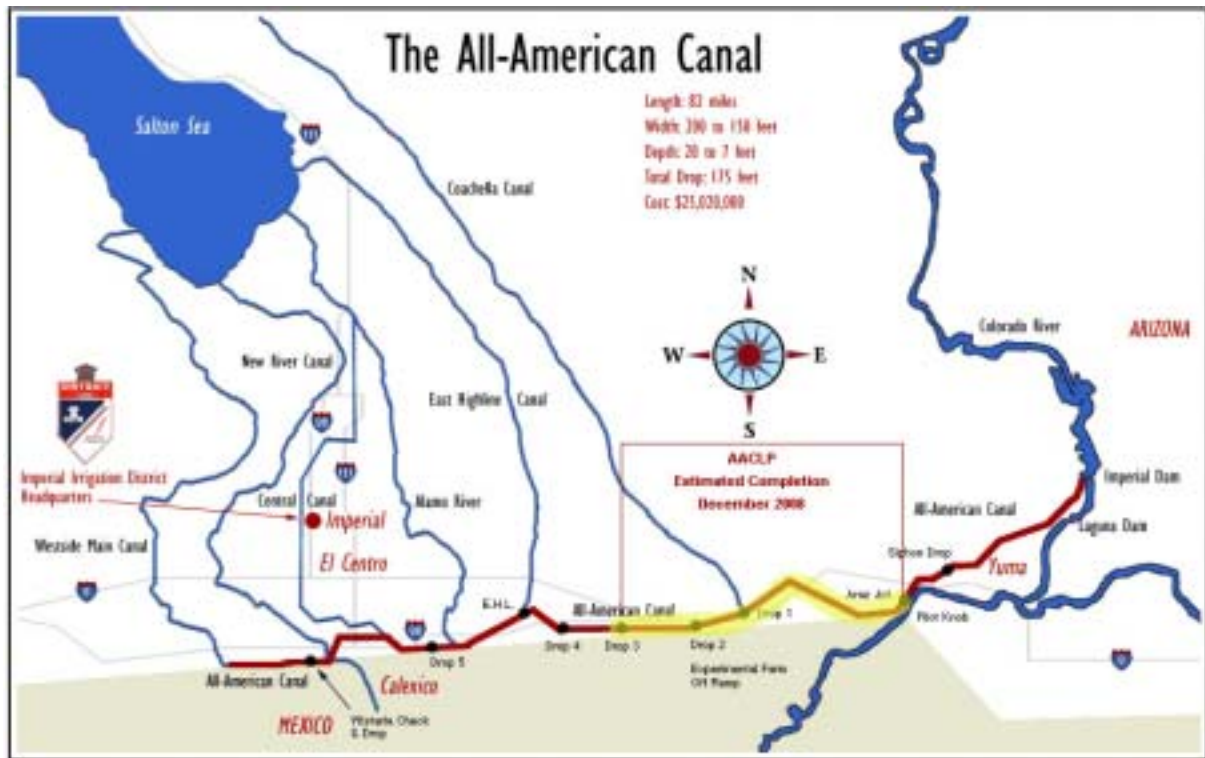


Source: <sup>16</sup>

CRA = Colorado River Aqueduct, which connects with the California Aqueduct to the north.

Colorado River water supplied to Palo Verde Irrigation District (PVID) is both diverted as surface water at Palo Verde Dam and as groundwater within their service area, with PVID's net use considered the sum of diversions less returns of agricultural drain water to the Colorado River. Colorado River water supplied to IID is diverted at Imperial Dam into the All-American Canal, which then feeds three main canals serving IID's distribution system, with agricultural drain water returning to either the Alamo River, the New River or directly into the Salton Sea. Coachella Valley Water District (CVWD) is also supplied Colorado River water via the All-American Canal and then via the Coachella Canal. CVWD has the ability to exchange its Colorado River water for a portion of Metropolitan Water District's (MWD's) State Water Project water on a one-for-one basis, utilizing the Colorado River Aqueduct crossing the Coachella Valley and providing the primary source for domestic water consumption in CVWD's service area along with groundwater. The All-American Canal and its interconnection with IID's and CVWD's service areas are as shown in Figure 2-2 – The All-American Canal. The All-American Canal also serves the Baja California region of Mexico.

**Figure 2-2  
The All-American Canal**



Source: 17

Note: AACLP = All American Canal Lining Project

## Salton Sea

The Salton Sea, the largest inland water body in California at 34 miles long and 9 to 10 miles wide, serves as the repository of agricultural drain water from IID and CVWD. Improved irrigation practices and cutbacks in California's allocation and use of Colorado River water will result in less agricultural drain water flowing into the Salton Sea leading to a gradual decrease in the Sea's elevation. The New River and Alamo River are the primary watercourses originating in Mexico, flowing northward into California and contributing inflow to the Salton Sea.

## Case Study: San Diego County Water Authority's Adaptations to Meet Future Water Supplies

Supply projections for San Diego County Water Authority (SDCWA) are presented in Table 2-2 as an example of the adaptations for change in the water resources mix that will be needed to meet growing demands over the next 20 years in the border region. Supply projections are expressed in AFY.

**Table 2-2**  
**Projected Changes in San Diego County Water Authority's Water Supplies, 2005-2025 (AFY)**

| <b>Water Supply Source</b>                     | <b>2005</b>    | <b>2010</b>    | <b>2015</b>    | <b>2020</b>    | <b>2025</b>    |
|--|----------------|----------------|----------------|----------------|----------------|
| Metropolitan Water District                    | 526,000        | 345,400        | 343,400        | 290,800        | 310,900        |
| Imperial Irrigation District Transfer          | 30,000         | 70,000         | 100,000        | 190,000        | 200,000        |
| All American & Coachella Canal Lining Projects | 0              | 77,700         | 77,700         | 77,700         | 77,700         |
| Seawater Desalinization                        | 0              | 56,000         | 56,000         | 56,000         | 56,000         |
| Local Surface Water                            | 85,600         | 85,600         | 85,600         | 85,600         | 85,600         |
| Recycled Water                                 | 33,400         | 45,100         | 51,800         | 53,400         | 53,400         |
| Groundwater                                    | 31,100         | 53,500         | 57,500         | 59,500         | 59,500         |
|  |                |                |                |                |                |
| <b>Total Supplies</b>                          | <b>706,100</b> | <b>733,300</b> | <b>772,000</b> | <b>813,000</b> | <b>843,123</b> |

Source: <sup>14</sup>

A review of SDCWA's projected changes in water supplies over the next 20 years shows a growing reliance on water transfers and conservation, increases in production/distribution of recycled water, and for the first time, development of seawater desalinization. These trends are further described as follows:

- Metropolitan Water District will reduce its supply to SDCWA on the order of 200,000 AFY during this period, as a result of SDCWA developing other supplies.
- IID will gradually provide up to 200,000 AFY of new supply to SDCWA resulting from water conserved within their district, primarily from fallowing agricultural land.
- SDCWA will receive a benefit of 77,700 AFY as a result of implementing the concrete lining of the All-American and Coachella Canals. Under these lining projects, approximately 24 miles of parallel, concrete-lined canal will be constructed next to a section of the existing 82-mile long All-American Canal and approximately 37 miles of parallel, concrete-lined canal will be constructed next to a section of the 123-mile long Coachella Canal, recovering a portion of the water that has been historically lost to seepage.
- As an entirely new source, seawater desalinization is proposed for developing 56,000 AFY of new water supply in coordination with treatment works at the Encina Power Plant in Carlsbad, serving water for both power plant processes as well as for SDCWA's consumptive needs. The proposed treatment works consisting of a reverse osmosis filtration system would have a capacity of 50 million gallons per day (mgd), equivalent to treating about 150 acre-feet per day.
- Recycled water production is projected to increase about 60 percent, from 33,400 AFY currently to 53,400 AFY by 2025.

While water districts like the entities within SDCWA appear to be progressing in obtaining supplies to meet their projected water demands over the next 20 years, in decades to follow the opportunities for securing additional water transfers and developing new supplies (except for the more costly supplies derived from seawater desalinization) are expected to be limited. Committing water resources for power plant cooling can be a 30 to 50 year proposition; whereas, normal water supply planning horizons conducted by water districts are typically 20 to 30 years, which may not anticipate the potentially competing needs for water supplies between power plant cooling and municipal uses. In addition, conservation of water and, in turn, the energy needed to transport, treat, and distribute the water, will result in lesser demands on these districts and increase opportunities to serve other customers.

## ***Water Use by Border Region Power Plants***

### **Existing and Proposed Border Region Power Plants and Associated Water Use**

The border region benefits from a broad and diverse range of developed energy resources. Existing and proposed power plants and their associated water uses are provided in Appendix C. Existing power production technologies include nuclear and conventional oil/gas-fired steam turbines, simple-cycle and combined-cycle gas combustion turbines, geothermal, biomass, hydroelectric, wind, and solar power. In looking ahead to meeting future energy (and water) needs within the region, it is clear that energy conservation and development of no- or low-water consuming renewables such as wind, solar, and certain kinds of geothermal are key options.

As can be observed for the border region power plants highlighted (shaded) in Appendix C, projects that can best conserve surface and ground water supplies and avoid water quality degradation are renewable projects such as wind and solar photovoltaic power, which do not rely on any water for project operations. The next group of projects having the least impacts on water supply and quality are certain types of geothermal projects such as the Salton Sea Geothermal Unit #6 Project, and gas-fired combined-cycle projects utilizing dry cooling such as Otay Mesa. Power facilities that rely on ocean water-fed once-through cooling systems are addressed later in this section. Water demands for supporting future power generation will be a function of the production technology, and the effect of policies encouraging no or low-water use technologies. In general, typical water use by production technology for the types of generation expected to meet future demand in the region is shown below in Table 2-3.

**Table 2-3**  
**Typical Water Use by Production Technology**

| Production Technology           | Cooling Process | Consumptive or Non-Consumptive | Gallons per MWh |
|---------------------------------|-----------------|--------------------------------|-----------------|
| Wind                            | N/A             | N/A                            | 0               |
| Solar Photovoltaic              | N/A             | N/A                            | 0               |
| Gas Combustion - Combined Cycle | Dry             | Consumptive                    | 50              |
| Geothermal                      | Wet             | Consumptive                    | 65              |
| Gas Combustion – Combined Cycle | Wet             | Consumptive                    | 250             |

Note: Geothermal water use is estimated based on the proposed Salton Sea #6 power plant operating at a 90 percent capacity factor. Water use of 65 gallons/MWh represents the demand from external sources of water, which is about 5 percent of the total water demands, used primarily for brine dilution. The balance of water supply is provided from treated steam condensate, meeting all of the remaining plant water demands including the most significant use, cooling tower makeup.

The general effect of committing the region's fresh water supplies for power plant cooling over a power plant's 30 to 50 year life is to preclude use for municipal and agricultural supplies, causing water districts to meet these needs from more treatment-intensive and expensive sources of supply, such as from seawater desalinization. Although the existing and currently proposed use of Colorado River water for meeting power plant cooling and process needs is only on the order of about 8,000 AFY, the effects are significant considering the cost to develop and maintain new municipal and agricultural water supply sources and transport new supplies to these users. As an example, drinking water produced from seawater desalinization is estimated to cost about \$800 to \$1,000 per acre-foot to process and distribute, compared to other sources of water that are typically in the range of \$200 to \$500 per acre/foot after treatment and distribution.

Water use by new energy supply sources will compete with increasing municipal and agricultural water demands. As an example, border region demand in Baja California alone is growing at a rate that requires a new 500 MW power plant approximately every 4 to 5 years.<sup>18</sup> If this energy demand is met by new combined-cycle power plants configured with wet cooling, water supplies of about 3,500 AFY would be needed during years 1 through 5; 7,000 AFY during years 6 through 10, and incrementally increasing by 3,500 AFY at 5-year intervals thereafter.

## ***Water Supply Issues Impacting Development of New Power Plants and their Cooling Methods***

Water supply issues that could impact the planning of new power plants and their cooling methods include the following:

- Valuing existing water supplies from a state-wide and border region perspective by recognizing that the increasing demands of a rapidly growing population cannot be met entirely by the limited opportunities to develop new water resources.
- Replacing diminished supplies from the Colorado River that will average about 20 percent less in the future before implementation of new water transfer and conservation measures.
- Managing and replenishing groundwater overdraft.
- Supporting the Salton Sea Restoration Plan by maintaining an adequate quantity and quality of inflows to find the Sea's equilibrium and protect its unique resources.

### **Water Supplies to Meet Future Population Growth**

The border region is experiencing rapid population growth. Supplying water to meet this population growth is depleting supplies normally available for agriculture. Many of the water transfers from agricultural to municipal use are facilitated by land fallowing agreements. Despite the plans to meet growing municipal water needs by primarily displacing agricultural water use and increasing the treatment and reclamation of wastewater, primarily for landscape irrigation, border entities such as the San Diego County Water Authority expect to rely on the development of desalinized seawater, which has previously been considered cost prohibitive. Although some recently developed or licensed power plants have proposed utilizing reclaimed water for cooling, California is approaching a time when even reclaimed water will be in short supply and highly valued. To serve the additional 2.4 million people anticipated in the border region by 2030, it will be necessary to develop additional water supplies on the order of at least 400,000 AFY.

In this arid region where there are no new significant sources of fresh water supplies anticipated from either development within or opportunities from imports, the outlook for the future is more problematical given the vulnerability to shortages during drought from two of the primary sources to this region, the Colorado River and State Water Project. If drought conditions similar to 1977 were to repeat, State Water Project deliveries could be cut to 20 percent of the primary contractual supply. These factors are leading to a growing reliance on treatment-intensive sources of lesser quality and higher cost water such as desalinized seawater, and/or sources having important long-term consequences, such as transferring water derived from fallowing once-productive agricultural lands.

## Reduction of California's Entitlement to Colorado River Water

Beginning in 2003, California experienced the immediate loss of about 0.8 to 1.0 million acre-feet (MAF) annually in its historic allocation and use of Colorado River water to assure that other states receive their lawful entitlements and that California does not exceed its legal entitlement of 4.4 million acre-feet per year (MAFY) unless surplus water is available. The recent historic use pattern by California entities receiving and dependent on Colorado River water is as follows:

**Table 2-4**  
**Annual Water Use of Colorado River Water in California during 2000 - 2004 & Forecasted for 2005 (Acre-Feet)**

| Entity          | 2000 Actual      | 2001 Actual      | 2002 Actual      | 2003 Actual      | 2004 Actual      | 2005 Forecasted  |
|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
| MWD             | 1,300,014        | 1,250,502        | 1,237,994        | 683,786          | 750,031          | 529,330          |
| PVID            | 511,947          | 492,634          | 540,786          | 379,650          | 412,700          | 479,419          |
| IID             | 3,112,770        | 3,085,531        | 3,152,984        | 2,978,223        | 2,757,120        | 2,918,387        |
| CVWD            | 342,871          | 329,478          | 331,107          | 296,808          | 319,385          | 352,900          |
| Others          | 91,630           | 96,575           | 102,738          | 70,330           | 46,728           | 81,963           |
| <b>CA Total</b> | <b>5,359,232</b> | <b>5,254,720</b> | <b>5,365,609</b> | <b>4,408,797</b> | <b>4,285,964</b> | <b>4,361,999</b> |

Source: <sup>15</sup>

Notes: MWD – Metropolitan Water District

PVID – Palo Verde Irrigation District

IID – Imperial Irrigation district

CVWD – Coachella Valley Water District

In reviewing U.S. Bureau of Reclamation's records of California's long-term historical annual use of Colorado River water supply since 1914, and the recent history of use among California beneficiaries since 2000 as shown in Table 2-4, the following is observed:

- California's long-established use of surplus Colorado River water is evident by noting it has used an annual volume in excess of its current annual allocation of 4.4 MAF in every year during 1953-2003, except in 1982 and 1983, which represents 49 of 51 years, or 96 percent of the time over the last half century.
- During 2000, California used almost 1 MAF in excess of its 4.4 MAF annual allocation, which is enough water to annually supply about 2 million average households, meeting the consumptive needs of about 6.4 million people.
- The Metropolitan Water District, which also serves San Diego County Water Authority, has incurred the most significant reduction of Colorado River water supply as a result of having a lower priority (Priority 4) entitlement to Colorado River water than other California entities. Prior to establishing other water transfers



of Colorado River water, Metropolitan Water District experienced about a 50 percent historical reduction in its own normal year allocation beginning in 2003, on the order of about 600,000 AFY.

**Figure 2-3 - Imperial Dam**



Imperial Dam is operated by IID and serves as the diversion for about 75 percent of California's water supply from the Colorado River. Water diverted into the All American Canal supplies IID, CVWD and portions of the Baja California area of Mexico.<sup>12</sup>

### **Managing and Replenishing Groundwater Overdraft**

Areas within the state, including the border region, relying on groundwater pumping for water supply are in overdraft in many locations, and in need of reversing this trend. In the Coachella Valley, the Coachella Valley Water District is replenishing groundwater where it has been over-drafted for years by purchasing surplus water, when available, and transporting it to recharge ponds, consisting of flooded plots of land, for percolation into the ground. Replenishing groundwater supplies is likely to continue as a water management option to store surplus supplies when available.

### **Supporting the Salton Sea Restoration Plan**

Support and implementation of the Salton Sea Restoration Plan requires maintaining an adequate quantity and quality of inflows for the sea to find an appropriate water level and salinity equilibrium for protection of its unique resources. Colorado River water transfers from agricultural to municipal use, such as the transfer planned from Imperial Irrigation District to San Diego County Water Authority, will reduce inflows to the Salton Sea and could affect its equilibrium. It is unclear if additional supplies will be sought to balance the inflow requirements of the sea.

## ***Effects of Once-Through, Wet, and Dry Cooling in the Region***

### **Once-Through Cooling**

Ocean water drawn into a conventional oil/gas-fired steam or nuclear power plant for condensing steam can have detrimental effects on aquatic life. These effects are normally caused by entrainment of smaller aquatic organisms in the cooling water system and impingement of fish on the debris screens entering the system. Ocean water discharged after circulating through the steam condensers can also have detrimental effects on aquatic life due to temperature changes and turbidity effects in the vicinity of a cooling water outfall. The temperature change can typically be on the order of an average daily increase of 15° Fahrenheit (F) to 20°F with shorter duration peak temperature increases of up to 25°F. The temperature increase, coupled sometimes with a scouring effect from high volume flowrates, can detrimentally change ocean habitat. In the case of the South Bay Power Plant on San Diego Bay, the cooling water outfall has caused a loss of up to 104 acres of eelgrass habitat and loss in the diversity of benthic invertebrates residing near the outfall, affecting larger species of fish and aquatic life depending on these life forms.<sup>19</sup>

Implementation of new federal regulations that went into effect September 7, 2004 under Section 316(b) of the Clean Water Act will help reduce and mitigate detrimental effects to aquatic life from cooling water intake structures of larger existing power plants (using more than 50 million gallons per day of cooling water). Likewise, implementing regulations under Section 316(a) of the Clean Water Act will help reduce and mitigate thermal effects of cooling water discharge. These facility and operating improvements are normally addressed in the renewal of the waste discharge requirements for power plants as facilitated by the Regional Water Quality Control Board every five years. The development of new or modified coastal energy sources that do not use once-through cooling will increase reliance on alternative methods of cooling (wet or dry cooling) and non-ocean water supplies. The chosen cooling method may be driven by scarcity of water supply.

However, some proposals for desalination facilities have focused on using existing coastal power plant sites to take advantage of the existing ocean water intake and ocean discharge infrastructure as well as on-site energy options to lower costs and increase treatment efficiencies. Combining power plant and desalination processes will prolong the use of once-through cooling and possibly perpetuate environmental impacts to aquatic systems from these sites.

Both of the conventional oil/gas-fired steam generation plants in San Diego County, the Encina and South Bay power plants, are credited recently with eliminating direct discharge of process wastewater (not cooling water) to the ocean, and instead routing process wastewater to their respective local publicly-owned treatment works. The treatment works can remove many of the wastewater contaminants before discharge to

the ocean or can avoid discharge altogether by reclaiming it for recycled water program uses such as landscape irrigation.

## **Wet Cooling and Dry Cooling**

For a simple-cycle gas combustion turbine, wet or dry cooling is normally associated with the inlet air-cooling of the combustion turbine. For a combined-cycle gas combustion/steam turbine power plant, wet or dry cooling is normally utilized for both inlet air-cooling of the combustion turbine and condensation of steam from the steam turbine. While wet cooling can create visually undesirable vapor plumes under certain conditions and contribute to air quality concerns, the most significant water-related effect is the evaporative loss and drift of cooling water, and the water supply requirements to replenish (makeup) those losses. In addition to supplying water to replace the evaporative and drift losses, wet cooling has the effect of concentrating the constituents found in the source water as water vaporizes. This requires dilution of the cooling water by draining some of the concentrated portion (blowdown) and replacing it with the cleaner source water. The effect of both makeup and blowdown for a wet cooling tower can account for about 80 to 90 percent of the consumption of the water supplied to a power plant, depending on whether the blowdown is treated onsite as wastewater and reused, or not reused and discharged offsite.

Dry cooling does not require any water for the cooling process, as it relies on circulating ambient air around the water jacket of the air-cooled condenser. For a combined-cycle gas-fired plant, dry cooling can reduce overall plant water demands by 95 to 98 percent compared to a wet-cooled power plant. For a dry-cooled combined-cycle plant, water is still required for steam generation, various plant processes, and possibly inlet air-cooling for the combustion turbines. Dry cooling towers are typically two to three times larger in area and two to three times taller in height than wet towers, and result in some generation peaking capacity loss during hot ambient air temperatures, due to less effective condensation of steam that causes a higher back-pressure and less output from the steam turbines. Since the steam turbines typically supply about one third of the overall plant generating capacity, the effect on total annual power plant production is typically a reduction in the range of two percent to five percent, when accounting for all temperature and power plant load conditions.

## ***Feasibility of Using Dry Cooling in Southern California and Mexico***

### **Currently Operating and Proposed Dry-Cooled Power Plants**

Dry cooling is a feasible method for cooling a combined-cycle gas-fired power plant, even in the hottest climates of California and Mexico. Dry cooling is currently used in California at the 540 MW Sutter Power Plant, which began operation in 2001, and the 240 MW Crockett Cogeneration Plant, which began operation in 1995. The 510 MW Otay Mesa

Power Plant, planned at a location 15 miles southeast of San Diego and 1.5 miles north of the U.S.-Mexico border, was licensed by the Energy Commission as a dry-cooled combined-cycle power plant and is currently under construction. In Nevada, dry-cooled power plants include the currently operating 480 MW El Dorado Energy Project in Boulder City, and two power plants under construction, the 1,200 MW Moapa Energy Facility located about 20 miles northeast of Las Vegas and the 575 MW Big Horn Power Plant located in Primm (about 55 miles southwest of Las Vegas). Four other dry-cooled power plants are currently proposed for Nevada.

### **Case Study of the Otay Mesa Power Plant**

The 510 MW combined-cycle dry-cooled Otay Mesa Power Plant was licensed by the Energy Commission in 2001 and is currently under construction. The project is located in a warm and dry region in San Diego County about 15 miles southeast of the City of San Diego and 1.5 miles north of the California-Mexico border. The proposed project would use only about 400 AFY of water provided by the Otay Water District for process and domestic needs. This compares to about 3,500 AFY if the project were configured with wet cooling technology. The higher water usage associated with wet cooling is primarily attributable to about 90 percent water loss in evaporation, drift, and blowdown from the wet cooling towers. Energy Commission staff has evaluated dry cooling as an alternative to several other proposed projects and has concluded that the average annual cost of energy production for a project configured with dry cooling is comparable in some cases to a project using wet cooling. In essence, the additional capital cost for dry cooling is offset by the reduction in annual water acquisition costs (including payments to farmers for land fallowing) and water/wastewater treatment costs. Even when accounting for a reduction in peaking capacity associated with dry cooling, as would occur during periods of hot ambient temperatures, the cost of production is typically expected to only increase about 0.5 to 3.5 percent compared to a project with wet cooling. The slight increase in cost of production would not affect the owner's ability to market its power at competitive rates, as it is within the range of its competitors.

### **Energy Commission's Policy Addressing Alternative Water Supplies, Cooling Methods and Wastewater Treatment at Power Plants**

In the interest of conserving California's water supplies and protecting water quality, the Energy Commission adopted a policy in its *2003 Integrated Energy Policy Report* that specifies it will only approve the use of fresh water for cooling purposes of power plants it licenses where alternative water supplies and cooling technologies are shown to be environmentally undesirable or economically unsound. Additionally, the policy requires the use of zero-liquid discharge technologies to provide onsite treatment and reuse of power plant wastewater, unless shown to be environmentally undesirable or economically unsound.

## ***Water Quality Issues That Could Result from Power Plants in the Region***

Some of the primary water quality issues that can result from power plant operation in the border region are as follows:

- Increases in total dissolved solids (TDS) or other pollutant concentrations resulting from reduced stream flows diverted for power plant water supply.
- Increases in TDS or pollutant concentrations resulting from wastewater discharge.
- Contamination of surface or ground water resulting from runoff on lands impacted by deposition of air pollutants, which are then transported into watercourses.
- Soil and water contamination resulting from leaking pipelines transporting fuels to power plants.
- Impacts associated with construction of linear facilities in sensitive areas such as deserts and wetlands.
- Thermal and chemical effects on ocean water and physical effects on ocean ecosystems resulting from once-through cooling.

## ***Water Supply and Quality Impacts to the Salton Sea from Use of Surface or Recycled Water, or from Wastewater Discharges into Watercourses That Feed the Salton Sea***

### **Salton Sea**

The Salton Sea depends primarily on agricultural drain water from Imperial Irrigation District and Coachella Valley Water District to sustain itself and maintain a fishery and migratory bird population. The sea is more than 220 feet below sea level and has no natural outlet. The Salton Sea Basin is part of the Lower Colorado River Delta system and historically lakes have existed in this basin as the course of the Colorado River has shifted. The current body of water formed in 1905 when a levee break along the Colorado River caused flows from the Colorado River to enter the basin for about 18 months. Since 1905, the sea has fluctuated in size with varying inflow, and it recently has had a surface area of 365 square miles.

A balance between inflowing water and evaporation has sustained the sea in the past. However, with no outlet, any salts that are dissolved in the inflow are trapped, although some do precipitate. Salt concentrations are rising and are currently about 44,000 milligrams per liter (mg/L), measured as TDS, which is about 25 percent higher than ocean water. Salinity will continue to rise under current conditions. As a result of recently approved water transfers and improved irrigation practices, the inflow to the sea is

expected to be less than it has been in the past. A reduction in inflow will cause the sea to shrink and cause salinity to rise faster than it would have without a reduction in inflow.<sup>20</sup>

## **Colorado River**

Improved irrigation practices and cutbacks in California's allocation and use of Colorado River water will result in less agricultural drain water, translating to less inflow to the Salton Sea. Reduced inflows to the Salton Sea will also occur as a result of the planned transfer of Colorado River water normally used for agricultural irrigation within Imperial Irrigation District's and Coachella Valley Water District's service areas to be used for municipal purposes within Metropolitan Water District's and San Diego County Water Authority's service areas. Lesser inflows to the Salton Sea will eventually cause a gradual decrease in the sea's elevation.

## **New River**

Originating about 15 miles south of Mexicali, Mexico, the New River crosses the international boundary at Calexico, California and travels about 60 miles through Imperial County before discharging into the Salton Sea. The New River receives urban runoff, untreated and partially treated municipal and industrial wastes, and agricultural runoff. The New River is considered one of the most degraded waters contributing inflow to the Salton Sea. Since 1997, the Colorado River Basin Regional Water Quality Control Board has been monitoring water quality on a monthly basis for the New River at the international boundary at Calexico. TDS (a measure of water salinity), Fecal Coliform, and other indicators of water quality are among the constituents monitored by regulatory agencies.

TDS in the New River has ranged from a minimum of 1,640 mg/L to a maximum of 3,480 mg/L, and averages about 2,600 mg/L. The TDS data varies and does not suggest any explainable pattern of change over time. The Termoelectrica de Mexicali and La Rosita Power Complex power plants (see below) near Mexicali began operating in 2003, and although the effect of their wastewater discharge is not expected to significantly change TDS in the New River, there is insufficient data to establish whether or not these facilities are impacting water quality.

One of the most alarming water quality constituents in the New River unaffected by power plant use is the concentration of Fecal Coliform, which is an indication of potentially infectious disease-causing pathogenic organisms in water. Measured values for Fecal Coliform range from a minimum of 8,000 MPN/100 ml (Most Probable Number per 100 milliliters) to 16,000,000 MPN/100 ml and average about 200,000 MPN/100 ml. The primary source of Fecal Coliform appears to be from municipal wastewater generated in the Mexicali area of Mexico, which only treats its wastewater to a primary standard and does not address full removal of organic matter or disinfection to prevent the spread of pathogens. Primary treatment or sedimentation in the Zaragoza Lagoons

near Mexicali serves as a process for settling suspended particles and to a lesser degree provides some surface contact aeration for oxidizing a small portion of organic matter in the wastewater. Increasing the treatment of municipal wastewater is feasible and will have energy implications that will need to be considered and supported.

### **Alamo River**

Also of concern to the Colorado River Basin Regional Water Quality Control Board with respect to degraded waters contributing inflow to the Salton Sea, is the water quality in the Alamo River. Like the New River, the Alamo River originates in Mexico and drains into the Salton Sea in California. Compared to the New River that contributes an average of 1,346,000 AFY to the Salton Sea, the Alamo River contributes about half that much, an average of 614,900 AFY.

### **Agricultural Drainage**

Imperial and Coachella Valley agricultural drains convey pollution due to agricultural practices in the valley, which affect water quality in the Salton Sea.

### **Termoelectrica de Mexicali and La Rosita Power Complex Case Study – Effects on New River and Salton Sea**

The 600 MW Termoelectrica de Mexicali (TDM) and the 1,060 MW La Rosita Power Complex (LRPC) power plants near Mexicali began operation in 2003. The power plants, which export power to California, use primary-treated wastewater from Mexicali's Zaragoza Lagoon for cooling and process needs. The LRPC is also capable of accepting untreated wastewater. The wastewater diverted for use by the power plants is treated to a tertiary level, treating up to a maximum of 13,387 AFY of the 33,200 AFY lagoon outflow. This results in significantly higher purification for up to 40 percent of the average annual flow through the Zaragoza Lagoon, that otherwise would only be treated to primary standards.

Of the maximum 13,387 AFY diverted from the Zaragoza Lagoon as water supply to the power plants, up to 10,667 AFY could be consumed, and the balance of 2,120 AFY is discharged as power plant wastewater into an approximately 6-mile long canal that discharges combined lagoon and power plant wastewater to the New River. Annual water use is estimated to average about 85 percent of the maximum quantities noted above and in Table 2-5 below.

Table 2-5 depicts the worst-case water supply and quality impacts to the New River and Salton Sea from use of wastewater from the Zaragoza Lagoon by the LRPC and TDM power plants, based on the plants operating at 100 percent capacity.

The environmental effects from operation of the LRPC and TDM power plants with respect to water quality and supply are not considered significant at this time. Some of the key environmental effects and benefits resulting from operation of the LRPC and TDM power plants are as follows:

- TDS in the New River at Calexico and at the outlet to the Salton Sea would increase slightly, approximately 5.6 percent and 2.1 percent respectively.
- Total TDS load to the New River and Salton Sea would decrease as a result of the power plants' use and treatment of Zaragoza Lagoon wastewater, on the order of 9 million pounds per year.
- The increase in TDS of New River flows contributing to the Salton Sea from 2,620 to 2,675 mg/L would remain less than 4,000 mg/L, consistent with the water quality objective for Colorado River Basin.
- Pathogens in the New River, as contributed by Zaragoza Lagoon, would be reduced by about 30 percent as a result of the power plants' water treatment and use.



**Table 2-5**  
**New River and Salton Sea Effects Resulting from the La Rosita Power Complex and Termoelectrica de Mexicali Power Plants**

| Location   | Water Supply and Use (AFY) | TDS (mg/L)         |
|--|----------------------------|--------------------|
|  |                            |                    |
| Zaragoza Lagoon Outflow to New River <u>before</u> LRPC and TDM Use                    | 33,200                     | 1,200              |
| LRPC and TDM Lagoon Water Consumed   | 10,667                     | 1,200              |
| Zaragoza Lagoon & power plant Outflow to New River <u>after</u> LRPC and TDM Use       | 22,533 (-32%)              |                    |
| New River at Border near Calexico <u>before</u> LRPC and TDM Use                       | 180,000                    | 2,620              |
| New River at Border near Calexico <u>after</u> LRPC and TDM Use                        | 169,333 (-6%)              | 2,766 (+5.6%)      |
| New River at its Outlet to Salton Sea <u>before</u> LRPC and TDM Use                   | 438,000                    |                    |
| New River at its Outlet to Salton Sea <u>after</u> LRPC and TDM Use                    | 427,333 (-2.5%)            | 2,675 (+2.1%)      |
| Total Inflows to Salton Sea <u>before</u> LRPC and TDM Use                             | 1,346,000                  |                    |
| Total Inflows to Salton Sea <u>after</u> LRPC and TDM Use                              | 1,335,333 (-1%)            |                    |
| Salton Sea Capacity (AF) and TDS before LRPC and TDM Use                               | 7,624,843 AF               | 44,000             |
| Salton Sea Capacity (AF) and TDS if no LRPC and TDM Use (at end of Year 1)             | 7,624,843 AF               | 44,444             |
| Salton Sea Capacity (AFC) and TDS <u>after</u> LRPC and TDM Use (at the end of Year 1) | 7,614,176 AF (-0.1%/yr)    | 44,507 (+0.14%/yr) |

Source:<sup>21, 22</sup>

**Notes:** 1) The Salton Sea naturally increases in TDS each year because inflows are conveying more salt while the Sea concentrates from evaporation.

2) New River annual flows at Calexico range from a low of 118,999 to a high of 264,000 AFY, with 180,000 AFY being average.

## **Opportunities for Environmental Improvements**

The following solutions to water supply issues could affect the planning of new power plants and their cooling methods in the region.

### ***Value Existing Water Supplies***

Valuing existing water supplies from a state-wide and border region perspective recognizes that the increasing water demands of a rapidly growing population cannot begin to be met by the few and limited opportunities to develop new water resources. Instead, California and the border region will be relying largely on conservation, reclamation and treatment of wastewater for reuse, water transfers, and developing groundwater recharge and storage aquifers to draw from when surface water is in short supply. Increased water use efficiency, reserving fresh water supplies for domestic and agricultural uses, use of alternative technologies and lower quality resources, and preventing degradation of existing resources by other users are likely results from valuing existing supplies. The Energy Commission's policies, along with other applicable laws, ordinances, regulations and standards addressing water use, support the valuing of existing water supplies and should be more broadly applied to energy projects to conserve, and prevent degradation of, water resources.

### ***Replenish Groundwater Aquifers***

Coachella Valley Water District's Windy Point Groundwater Recharge Area, which is located west of Palm Springs, is an example of capturing surface water when plentiful to replenish depleted groundwater resources. The Windy Point Groundwater Recharge Area is used for storing surplus Colorado River and State Water Project water when available for groundwater recharge. The groundwater recharge helps to offset overdraft of the groundwater aquifer and build reserve storage of up to five million acre-feet as a water bank for local water districts that can be used in dry years when other supplies may be limited.

**Figure 2-4**  
**Coachella Valley Water District's**  
**Windy Point Groundwater Recharge Area**



Source: <sup>13</sup>

### ***Salton Sea Restoration Plan***

The Salton Sea Restoration Plan recognizes the need to maintain adequate quantity and quality of inflows for the sea to establish equilibrium and for protection of its unique resources. As background, the Salton Sea Reclamation Act of 1998 directed that studies be conducted to evaluate the feasibility of possible actions to allow continued uses at the sea. Following passage of the Act, a study was initiated to develop alternative measures to address rising salinity and other problems at the Salton Sea.

In April 2003, the Salton Sea Authority (Authority) Board of Directors endorsed moving forward with an Integrated Water Management Plan for the Salton Sea. Recognizing that inflows to the sea are likely to be reduced in the near future due to reallocation of Colorado River supplies and potential reductions in flow from the Alamo and New Rivers in Mexico, the Plan evolved from recent concepts for a smaller sea, as well as earlier work by the Authority and U.S. Bureau of Reclamation. The Authority subsequently commissioned engineering feasibility studies and further analysis of the Integrated Plan.

During 2003, the Quantification Settlement Agreement was also in the process of being approved and legislation was developed to acknowledge the linkage between water transfers and the health of the Salton Sea. The Quantification Settlement Agreement will

allow for transfers of Colorado River out of the Imperial Valley. Such transfers are expected to substantially reduce the inflow to the Salton Sea. In association with the approval of the Quantification Settlement Agreement, three bills were signed into law in September 2003 that specify a state-led program to develop a preferred restoration alternative by December 2006, including consideration of the currently preferred alternative as fostered by the Authority. The package of legislation also provides a mechanism to generate up to \$300 million for Salton Sea restoration through the sale of transferred Colorado River water. The state is now in the process of implementing the planning requirements for these laws dealing with the Salton Sea restoration.

Key restoration objectives are as follows:

- Preserve the Salton Sea as a repository for agricultural runoff.
- Provide a large marine lake with stable elevation.
- Improve water quality (salinity, nutrients and other constituents).
- Maintain and improve habitat.
- Increase recreational and economic potential.
- Address air quality concerns.

The Salton Sea Local Restoration Plan, shown in Appendix D, provides an illustration of the restoration alternative preferred at this time. A component of the currently preferred alternative would accommodate geothermal energy expansion by opening up previously flooded areas of the Salton Sea lakebed for development. By understanding the overall framework of the Salton Sea Integrated Water Management Plan, the Energy Commission will be positioned to make informed decisions as to the water quality and supply effects of the new energy projects being considered for licensing, including those harnessing geothermal resources. The currently preferred alternative of the Salton Sea Local Restoration Plan would consist of constructing an 8.5-mile long central causeway/retention structure dividing the existing sea into two distinct sections consisting of the north and south basins. The north basin would serve as a marine lake controlled to maintain ocean-like salinity. The south basin would serve as a shallower lake habitat, where salts would be allowed to concentrate. Control of lake level in the North Basin would be managed by funneling inflows entering the South Basin through a regulated water conveyance channel. Salinity in the North Basin would be controlled by treatment of a portion of the South Basin inflows using desalinization plants. Outflows from the North to the South Basin would allow for draining and replacing lower quality with higher quality water.

### ***Encourage Development of New Power Plants, Leading to Retirement of Older, Less Efficient Generating Units***

As new, more efficient and environmentally-friendly energy resources are developed, they will tend to replace older less-efficient generating units. Retirements or replacements

of less efficient plants will likely include some of the coastal conventional steam units relying on once-through cooling. To the extent once-through cooling using ocean water is reduced, the adverse environmental effects will be reduced. The adverse effects typically include loss of aquatic organisms and small marine species through entrainment and impingement as cooling water is drawn into the power plant's condenser, and alteration/loss of marine habitat resulting from discharge of the heated ocean water. Generating unit retirements or replacements may also need to address habitat restoration.

### ***Reduce Power Plant Water Use***

The following opportunities related to future power plants would improve surface water supply and quality in the border region:

- Promote renewable energy projects such as wind and solar photovoltaics that do not require any water use for power production and can best conserve water supply and avoid water quality degradation.
- Promote energy projects that require minimal water use for power production such as geothermal projects like Salton Sea Unit #6 and gas-fired combined cycle projects utilizing dry cooling.
- Avoid degrading existing water supplies by requiring pre-treatment of wastewater discharge from power plants with zero liquid discharge systems. These systems maximize the internal re-use and recycling of waste-streams within the energy facility processes and eliminate any wastewater discharge.
- Avoid committing significant border region water supplies for power plant cooling, which over the typical life of a power plant of 30 to 50 years would preclude use for municipal or agricultural supplies over this term.

## **Conclusions**

In the interest of coordinating local, state, and national permitting processes to meet environmental standards and permitting goals and to resolve energy-related environmental problems in the border region, staff suggests that the IEPR Committee give consideration to the following policy options and actions:

- Participating in the appropriate water and energy working groups and policy forums of the Border 2012 Framework. Involvement in these groups will help implement a coordinated approach to improve water use efficiency and energy efficiency. Involvement in the Framework forums may also result in coordinated renewable electricity generation strategies that also reduce water use.

- In the interest of achieving California's Renewable Portfolio Standard (RPS) (which requires investor-owned utilities to increase the amount of renewable energy they procure by 1 percent per year toward a target of 20 percent renewables by the year 2017), considering the benefits of continuing to provide incentives for development of no- or low-water consuming renewable energy (solar photovoltaics, wind, and certain kinds of geothermal), which avoids effects on water supply or quality. One possible incentive could be extending the term of the Solar and Wind Energy System Credit (Senate Bill 17x2 Brulte, Chapter 12, Statutes of 2001-02, Second Extraordinary Session) beyond the current termination date of December 31, 2005.
- Promoting a water policy for power plants less than 50 MW similar to one adopted in the 2003 *Integrated Energy Policy Report* for power plants 50 MW and larger. The policy addresses alternative water supplies, cooling methods, and treatment of wastewater discharge aimed at conserving higher quality sources of water supply and protecting water quality. A related policy should be considered for industrial users (other than power plants).
- Coordinating with the Department of Water Resources, water and energy utilities, the California Urban Water Conservation Council, the Association of California Water Agencies, and other key stakeholders to provide greater incentives for both water and energy conservation. The initial focus should be on those strategies that reduce both water and energy consumption and distribution losses.
- Supporting the Salton Sea Restoration Plan by providing input to agencies and developers on ways to improve water use efficiency related to energy use, development, and facility operation, as well as providing information on alternatives to water use in energy facilities.

# CHAPTER 3: ELECTRIC TRANSMISSION LINES AND NATURAL GAS PIPELINES

## Introduction

The San Diego region relies heavily on imported energy resources to meet local demand despite significant transmission constraints. Transmission lines coming into San Diego from Mexico and the Imperial Valley are often operating at capacity, particularly during periods of peak demand. Power from Arizona flowing through the Southwest Power Link into the San Diego area is critical for the region. Congestion on this and other San Diego Gas & Electric Company (SDG&E) transmission system lines is costing California ratepayers millions of dollars and forcing SDG&E to rely more on the aging Encina and South Bay power plants to supply needed electricity.

To alleviate transmission congestion and to access new sources of generation, including renewable resources, SDG&E is pursuing development of major transmission system upgrades. How long it takes to complete these upgrades could affect SDG&E's ability to meet its goal of supplying 20 percent of its electricity from renewable generation sources by 2010.<sup>23</sup> A transmission line running east to access geothermal resources in the Imperial Valley is one option; another option could be a new line to access geothermal and wind power in northern Mexico. However, expansion of the Imperial Irrigation District (IID) and Baja California electrical systems may also be necessary to increase the power import capability from Mexico and southeastern California to the San Diego region.

This chapter will describe the existing electric transmission issues in the California-Mexico border region and the transmission projects under consideration to address existing constraints. This chapter will also briefly describe the existing natural gas pipeline network in the border region, as well as new pipeline projects announced to deliver gas from planned liquefied natural gas facilities in Baja California.

Obtaining the necessary permits and approvals in order to construct new electric and gas transmission projects is a complicated and time-consuming process. A multitude of federal, state, and local agencies on both sides of the border are involved in the permitting of cross-border transmission lines and gas pipelines. This chapter will explain the roles and responsibilities of these agencies and will describe some of the environmental and land use constraints to siting new transmission lines and gas pipelines that are unique to the border region. A case study will illustrate the permitting and environmental challenges proponents will face in siting cross-border transmission projects.

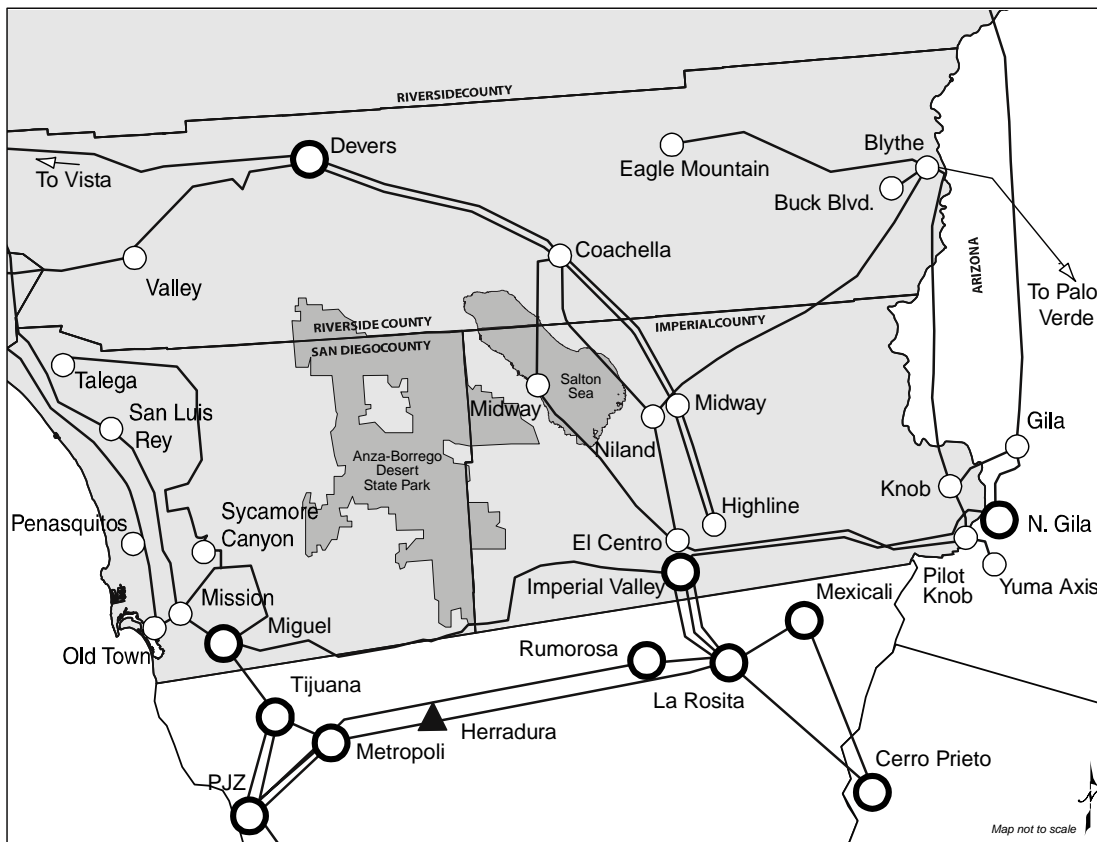
# Electric Transmission Issues in the Border Region

## *San Diego Gas and Electric Transmission System Constraints*

Figure 3-1 depicts the existing electric transmission system in the border region.

Transmission lines coming into San Diego from Mexico and the Imperial Valley are often operating at capacity, particularly during periods of peak demand. The congestion on these lines is costing California ratepayers millions of dollars and forcing SDG&E to rely more on the aging Encina and South Bay power plants to supply its demand for electricity. The Valley–Rainbow transmission project, denied by the California Public Utilities Commission (CPUC) in late 2002 and again on appeal in 2003, would have established a 500 kilovolt (kV) interconnection between the SDG&E and Southern California Edison electric transmission systems, and could have reduced congestion costs paid by ratepayers. This contentious project faced significant opposition from citizen groups, such as Save Southwest Riverside County and the Pechanga band of Luiseno Indians.

**Figure 3-1**  
**Existing Border Region Electric Transmission System**





## ***San Diego Gas and Electric Transmission System Improvements***

### **Miguel-Mission 230 Kilovolt #2 Transmission Line (Under Construction)**

On July 8, 2004 the CPUC granted SDG&E a Certificate of Public Convenience and Necessity for the Miguel-Mission 230 kV #2 Project. This new transmission line will help to relieve some of the congestion on SDG&E's transmission system and will increase the system's ability to transfer electricity from two natural gas-fired power plants recently built in Mexicali, Mexico, and from new generation located in Arizona.<sup>24</sup> Construction of the new Miguel-Mission transmission line began in October 2004; the line is expected to be operational by June 2006.<sup>25</sup> In October 2004, SDG&E completed a new 500 kV switchyard and transformer at the Miguel Substation, improving system reliability and reducing energy costs for Southern California electricity customers by easing congestion at Miguel.

### **Proposed Lake Elsinore Advanced Pump Storage Project**

The Lake Elsinore Advanced Pump Storage Project, a 500 MW<sup>26</sup> pumped storage generation facility proposed at Lake Elsinore in Southern California, is a potential source for importing more power into San Diego. Associated with the proposed project is a 30-mile, merchant-owned 500 kV transmission line that would connect Southern California Edison's Valley-Serrano 500 kV line to a new substation within SDG&E's service territory. This transmission line would be similar electrically to the Valley-Rainbow line that was denied by the CPUC in December 2003. The Lake Elsinore Advanced Pump Storage Project would increase the transmission capability from Southern California Edison into SDG&E by approximately 750 MW.

The Lake Elsinore Advanced Pump Storage Project is not subject to state regulation, but under the jurisdiction of the Federal Energy Regulatory Commission, where an application is currently in review.

### **SDG&E Transmission Comparison Study Working Group**

The SDG&E Transmission Comparison Study Working Group is evaluating a number of alternatives for importing additional power into the San Diego area, including power from geothermal resources. The group issued a draft report in April and reported on their results at the Southwest Transmission Expansion Plan meeting in April. The study group began in late 2004 with 18 potential transmission options for importing power into the San Diego area. That number has been reduced to four 500 kV alternatives from which a preferred alternative will be selected by the end of May. The alternatives are:

- Miguel option – 500 kV line from the Imperial Valley to Miguel substations;
- Northern option – 500 kV line from Serrano to Valley substations to San Diego;

- Eastern option – 500 kV line between Imperial Valley Substation and central San Diego; and
- Full loop option – 500 kV line from Imperial Valley Substation to San Diego to Valley Substation.

The study group used reliability, economic, and renewable access criteria – each weighted equally – in evaluating the alternative projects. A final report is expected in May 2005.

### ***Imperial Irrigation District Transmission System Constraints***

IID is a community-owned utility providing power to customers in Imperial County and parts of Riverside and San Diego counties. Approximately 540 MW of power from the Salton Sea geothermal power plants currently flows through the IID system. However, because of the existing congestion constraints at the Imperial Valley Substation and Blythe Substation, which are interconnection points to the California Independent System Operator (CA ISO) grid, IID is unable to deliver additional geothermal resources into the CA ISO control area. IID has been extremely active in the Imperial Valley Study Group, an offshoot of the Tehachapi Study Group, formed under the CPUC Proceeding I.01-11-001.<sup>27</sup> Other members of the Imperial Valley Study Group include representatives of SDG&E, Southern California Edison, the CA ISO, the Western Area Power Administration, the U.S. Bureau of Land Management, the Comisión Federal de Electricidad, the counties of Imperial, Riverside, and San Diego, and geothermal power producers. The Imperial Valley Study Group is developing a phased implementation plan for the construction of transmission upgrades capable of exporting 2,000 MW of geothermal power from the Imperial Valley region of California by 2014.

### ***Baja California, Mexico Transmission System Constraints***

Constraints within the Baja California transmission system are primarily related to its peninsular location which makes connections to the Mexican national grid (National Electric System) difficult. There are two 230 kV transmission lines (Path 45) connecting Baja California with San Diego and the Imperial Valley that enable power transfers between northern Mexico and Southern California. One transmission line runs between SDG&E's Miguel Substation and Comisión Federal de Electricidad's (CFE's) Tijuana Substation, and the second runs between SDG&E's Imperial Valley Substation and CFE's La Rosita Substation. These transmission lines can transfer approximately 400 MW of power in the summer and 800 MW in the winter from Baja California to California. Power transfer capacity from California to Baja California is currently limited to approximately 400 MW. At present, CFE has no plans to upgrade Path 45 between the CFE and California power grid.<sup>28</sup>

The world's second largest known geothermal field is located in Baja California Norte. The Cerro Prieto geothermal field, with at least nine geothermal electric plants in

operation, currently produces about 720 MW of electricity. Power from Cerro Prieto can be transferred to California through Path 45. However, Path 45 is not configured to send large amounts of power across the border. If CFE should commit geothermal energy to the U.S., CFE would need to analyze if upgrades to the CFE power grid or interconnection with the California grid are necessary. CFE is currently analyzing the possibility of adding 25 MW of capacity at Cerro Prieto, as well as replacing two old 37.5 MW generating units in 2009. However, the purpose of this project would be to meet CFE requirements.<sup>29</sup> An impediment to developing more geothermal power at Cerro Prieto is that economically recoverable heat has been almost completely developed.<sup>30</sup> There is potential to use heat from the residual brine that results from the operation of the existing geothermal units. It is estimated that as much as 246 MW of additional power could be produced in this manner.<sup>31</sup>

While there may be additional geothermal potential in Baja California Norte, the SDG&E Transmission Comparison Study Working Group concluded, on the basis of their analysis, that an alternative involving a new 230 kV line in Mexico running between the La Rosita and Tijuana substations, with reinforcements to the 230 kV lines between the Tijuana and Miguel substations and the La Rosita and Imperial Valley substations (Path 45), did not meet the study criteria. The study group also identified a number of other issues that resulted in this option being dropped from consideration, including:

- Poor thermal performance;
- Increased congestion at Miguel Substation;
- Significant regulatory issues including potential ownership issues (Mexican law currently requires CFE to own transmission lines in Mexico), financing issues, and U.S. Presidential permits;
- Difficulty meeting the 2010 target date for renewable resources because of international uncertainties;
- Uncertainties over the economic geothermal potential in Baja California; and
- Does not meet SDG&E's regional goal of tying its 500 kV system to the 500 kV backbone.

## **New International Transmission Lines**

In December 2001, Baja California Power, Inc., InterGen Aztec Energy, V.B.V. and Sempra Energy Resources received Presidential permits from the U.S. Department of Energy to construct, operate, and connect two 230 kV transmission lines at the U.S.-Mexico border. The two transmission lines run from the Imperial Valley Substation in the U.S. to the La Rosita Power Complex and Termoeléctrica de Mexicali – two natural gas-fired combined-cycle power plants built in Mexicali, Mexico by InterGen and Sempra, respectively. The power plants began commercial operation in 2003. The La Rosita Power Complex has a total generating capacity of 1060 MW, of which 560 MW is exported to the U.S. Of this power exported to the U.S., 470 MW can be transmitted via the line owned by InterGen and 90 MW can only be transmitted via the La Rosita-Imperial

Valley line owned by CFE and SDG&E.<sup>32</sup> Termoeléctrica de Mexicali has a generating capacity of 650 MW, all of which is exported to the U.S. via the international line owned by Sempra.

## **Existing and Future Natural Gas Pipelines in the Border Region**

Presently, the electricity generation sector is the largest consumer of natural gas in California. Prior to 1997, natural gas consumption for electricity generation averaged around 500 billion cubic feet per year. Since 1997 fuel use for power generation has been averaging around 750 billion cubic feet per year as nearly all of the new thermal power plants licensed by the Energy Commission are natural-gas fired facilities. Except for the Salton Sea Geothermal Unit #6 Project, all of the power plants recently approved in the border region are also natural gas fired, thus increasing the need for additional new or expanded natural gas infrastructure to support the growing demand.

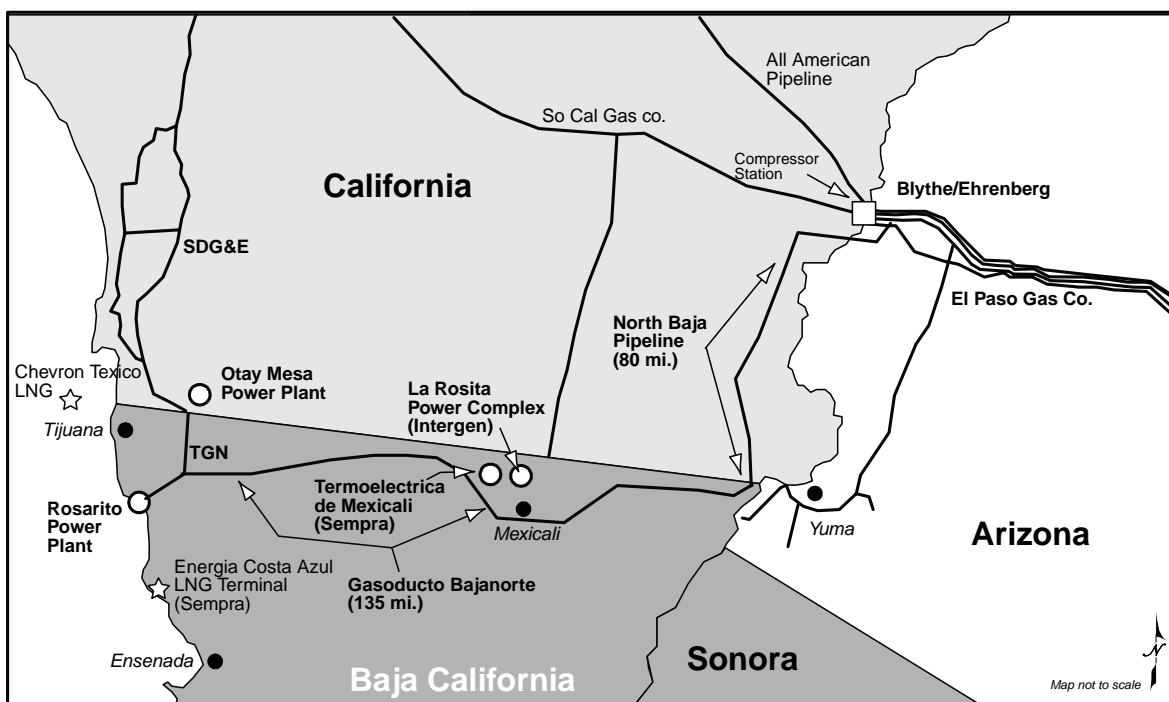
One major drawback of this increasing demand for natural gas is that the border region does not have any storage facilities to back up supply deliverability as exists in the Pacific Gas and Electric Company and Southern California Gas Company service areas. Hence the only way to ensure supply availability is by making sure that the pipeline capacity is large enough to meet the load in the region. To ensure that sufficient gas reaches the region, existing pipelines will need to be expanded and it is likely that new pipelines to meet growing demand will also be needed.

There are three primary gas pipelines in the border region. The pipelines are:

- North Baja System – pipeline connecting Ehrenburg, Arizona and Rosarito, Baja California.
- Transportadora de Gas Natural - pipeline connecting Sempra Utilities pipelines in San Diego with power generation plants in Baja California.
- Southern California Gas Company pipeline - connecting pipelines in California with pipelines in Mexicali, Baja California.

Figure 3-2 shows the existing gas pipeline system in the border region. The figure also shows the location of two planned liquefied natural gas facilities in Baja California.

**Figure 3-2**  
**Border Region Natural Gas Pipeline System**



### ***North Baja System***

This 220-mile natural gas pipeline serves the growing energy demand in Baja California, Mexico, and portions of Riverside, Imperial, and San Diego counties in California.<sup>33</sup> The North Baja System consists of two segments as described below.

The North Baja Pipeline is an 80-mile pipeline owned by TransCanada Corporation that starts at an interconnection with El Paso Natural Gas Company near Ehrenberg, Arizona, and traverses southeastern California to the U.S.-Mexico border to connect with a 140-mile gas pipeline (Gasoducto Bajanorte) in Mexico owned by Semptra Energy International.

The 140-mile Gasoducto Bajanorte natural gas pipeline starts at an interconnection with the North Baja Pipeline west of Algodones and travels west through the cities of Mexicali and Tecate, terminating at an interconnection with the Transportadora de Gas Natural pipeline (discussed further below).

The North Baja System began service in September 2002, with an initial capacity of 200 million cubic feet per day. Completion of a 21,000-horsepower compressor station in December of 2002 brought the pipeline's capacity to 500 million cubic feet per day. This pipeline system is likely to be a major path for delivering natural gas into markets in

Southern California and Arizona from ChevronTexaco's GNL Mar Adentro de Baja California liquefied natural gas terminal proposed off the coast of Tijuana.<sup>34</sup>

### ***Transportadora de Gas Natural***

Sempra Energy International's 23-mile Transportadora de Gas Natural pipeline runs from the U.S.-Mexico border near San Diego to the Presidente Juárez power plant in Rosarito, Baja California. This 30-inch natural gas pipeline began supplying natural gas to the Presidente Juárez power plant in the summer of 2000.

### ***Planned Natural Gas Pipelines***

Sempra Pipelines and Storage is planning an expansion of its Baja California pipelines (Gasoducto Bajanorte and Transportadora de Gas Natural) to transport natural gas from Energía Costa Azul, a liquefied natural gas terminal being developed in Baja California, Mexico, by Sempra LNG. The expansion includes building a 45-mile spur pipeline (to connect the Transportadora de Gas Natural pipeline to the Energía Costa Azul liquefied natural gas terminal) and looping or compressing, on the Gasoducto Bajanorte and Transportadora de Gas Natural pipelines. Looping means that a second pipeline will be laid next to the existing pipelines. The looping is in segments or all along the entire length of the existing line, depending on how much capacity has to be increased. The expansion is expected to begin operations in 2008.

## **Regulatory Framework**

This section describes the roles of some of the governmental agencies on both sides of the border that are responsible for issuing permits or other approvals to construct and operate electric transmission lines and natural gas pipelines. The Final Environmental Impact Statement for the Imperial-Mexicali 230 kV Transmission Lines and the Final Environmental Impact Statement/Environmental Impact Report for the North Baja Pipeline Project were used to identify the U.S. federal, state, and local agencies involved in permitting transmission lines and gas pipelines that connect at the California-Mexico border.

### ***Transmission Line and Natural Gas Pipeline Permitting in Mexico***

The Comisión Reguladora de Energía (CRE, the Mexican equivalent of the Federal Energy Regulatory Commission in the U.S.) is an independent regulatory agency with jurisdiction over the electrical and gas industries in Mexico. CRE regulates state entities and private participants and authorizes import activities. The Ministry of Energy authorizes export activities.<sup>35</sup> As part of Mexico's interest in creating a competitive natural

gas industry, CRE now allows private firms to own and operate natural gas pipelines, distribution systems, gas storage, and liquefied natural gas facilities.

To construct an international transmission line or natural gas pipeline, the proponent must submit an environmental impact and risk analysis of the project to the Secretariat of Environment and Natural Resources (Secretaría del Medio Ambiente y Recursos Naturales, SEMARNAT). The Secretariat of Environment and Natural Resources reviews the information for compliance with the General Law of Ecological Equilibrium and Environmental Protection (Ley General del Equilibrio Ecológico y la Protección al Ambiente), which establishes the overall regulatory framework for environmental compliance in Mexico. If the project is in compliance, the Comisión Reguladora de Energía will grant an environmental impact and a risk license.<sup>36</sup>

The Comisión Federal de Electricidad (CFE) is responsible for the production, transport and distribution of electricity in Mexico as well as energy trade with the U.S. and Belize. CFE is not a public company, but a decentralized agency of the federal government. Until 1992, the CFE was a monopoly; however since then independent power producers have been allowed to sell their energy to the CFE.<sup>37</sup> Rates are set by the Ministry of Finance. Private parties can import or export energy using CFE infrastructure.<sup>38</sup>

### ***U.S. Permitting and Approvals for Cross-Border Electric and Natural Gas Transmission Projects***

Executive Order 10485 (September 9, 1953), as amended by Executive Order 12038 (February 7, 1978), requires that a Presidential permit be issued by the U.S. Department of Energy (DOE) before electric transmission facilities may be constructed, operated, maintained, or connected at the U.S. international border. The DOE must determine whether a proposed transmission line is in the public interest before granting a Presidential permit. In determining whether a proposed transmission line is in the public interest, the DOE considers the impact of the proposed line on the environment and on the reliability of the U.S. electric power supply system. The DOE also must obtain the concurrence of the U.S. Departments of State and Defense before it may grant a Presidential permit. Issuance of a Presidential permit only indicates that the DOE has no objection to the project; it does not mandate that the project be completed.<sup>39</sup>

The Federal Energy Regulatory Commission (FERC) is the agency that issues Presidential permits for interconnecting natural gas transmission facilities at the U.S. international border (Section 3 of the Natural Gas Act). If the natural gas pipeline is an interstate pipeline, as defined under Section 7C of the Natural Gas Act, then the developer must obtain a Certificate of Public Convenience and Necessity (CPCN) from the FERC. For interstate pipelines connecting at the U.S. international border, the FERC would issue the Presidential permit as an adjunct to the CPCN. Although the FERC has responsibility for issuing Presidential permits for natural gas pipelines, the U.S. Secretary of State participates in these proceedings. Prior to issuing a Presidential permit, the

FERC must solicit input from federal, state, and local government officials and the public on whether the proposed project is in the national interest.

In most cases, the FERC would be the lead agency for environmental impact review for interstate pipelines. If the project would cross federally-owned land, a typical scenario would have the FERC in the lead role, with the federal land management agencies acting as cooperating agencies. All federal agencies that issue permits need to ensure that the National Environmental Policy Act environmental document will be adequate to address their requirements, regulations, and policies. Less frequently, where a project is predominantly on federal land, the federal land managing entity will assume the lead role, with the FERC as a cooperator.

### ***Other U.S. Approvals for Electric and Natural Gas Transmission Projects***

A right-of-way grant from the U.S. Bureau of Land Management (BLM) is required to construct a transmission line or natural gas pipeline across public lands managed by the BLM. To obtain a right-of-way grant, a project proponent must submit an “Application for Transportation and Utility Systems and Facilities on Federal Lands” to the BLM. In reviewing an application for a right-of-way grant, the BLM must consider land status, consistency with land use plans, affected resources, resource values, environmental conditions, and concerns of various interested parties. The BLM has designated utility corridors in the southeast desert area of California. If transmission lines or natural gas pipelines are proposed on federal lands, the BLM encourages locating the facilities within the designated corridors. Proposing facilities outside of these corridors requires an amendment to the California Desert Conservation Plan.

If a proposed transmission line or pipeline route will cross land owned by multiple federal jurisdictions, then the BLM acts as the coordinating entity among the federal land managing agencies, which could include the Forest Service, Army Corps of Engineers, Bureau of Reclamation, Fish and Wildlife Service, and the Department of Defense. BLM would ultimately issue a single right-of-way grant covering all federal lands.

The U.S. Forest Service has responsibility and authority similar to that of the BLM for national forest lands. If there are no other federal agencies with a greater degree of involvement, the Forest Service could serve as lead agency for compliance with the National Environmental Policy Act. The Forest Service has a permitting process for granting easements and has policies for the Pacific Southwest Region intended to encourage the use of existing utility corridors.<sup>40</sup>

Crossing Indian reservation and trust lands requires a right-of-way grant from the Bureau of Indian Affairs, which will not be issued without the consent of the tribe(s) involved. Like other federally administered lands, the developer or regulatory agency has no ability to condemn for rights-of-way. Unlike other federally administered lands, there is no obligation for the tribes to plan for or attempt to accommodate utility corridors within a



multiple-use concept, so the granting of rights-of-way is entirely discretionary on the part of the tribal entity. Moreover, at the end of the grant's term, the grantee must repeat the approval process. If renewal of the grant is denied, the transmission line or gas pipeline may be required to be removed from tribal lands. These factors have typically led proponents to avoid routing across Indian lands whenever possible.

The U.S. Fish and Wildlife Service considers the lead agency's finding of impact on federally-listed or proposed threatened or endangered species. The Fish and Wildlife Service will issue a Biological Opinion if the proposed transmission line or pipeline could jeopardize federally-listed or proposed species or their habitats (Section 7 Consultation and Biological Opinion per the Endangered Species Act).

Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to regulate discharge of dredged or fill material to the waters of the U.S. and adjacent wetlands. The Army Corps of Engineers issues individual site-specific or general (Nationwide) permits for such discharges. Construction of a transmission line or natural gas pipeline across navigable waters requires a Section 10 (Rivers and Harbors Act) permit from the Army Corps of Engineers.

### ***State of California Permitting and Approvals***

The planning, siting and construction of transmission projects by investor owned utilities (IOUs) are largely governed by the CPUC's General Order 131-D.<sup>41</sup> The IOUs are required to file an application and receive approval for a CPCN prior to building a transmission project in excess of 200 kV. A "permit to construct" is required before an IOU can build a new or upgraded transmission facility between 50 kV and 200 kV. For transmission facilities proposed by the IOUs, the CPUC serves as the lead agency for the purposes of complying with the California Environmental Quality Act (CEQA). The CPUC is responsible for issuing a CPCN for a gas pipeline project exempt from Section 7 of the Natural Gas Act.

The California State Lands Commission issues right-of-way permits (land-use leases) for projects crossing state lands. The State Lands Commission may act as the lead agency under CEQA when preparing an Environmental Impact Report.

The Energy Commission has exclusive jurisdiction over thermal power plants with a net generating capacity of 50 megawatts or more. The certificate from the Energy Commission covers the transmission and natural gas lines interconnecting the proposed power plant with the electric and gas transmission grids.

The California Department of Fish and Game is responsible for issuing a Section 2081 Incidental Take Permit for state-only listed species and a Section 2080.1 Consistency Determination for effects on species that are both state- and federally listed (California Endangered Species Act). The Department of Fish and Game also reviews mitigation agreements and mitigation plans for plants that are listed as rare (California Native Plant

Protection Act). Lastly, the Department of Fish and Game is responsible for issuing a Section 1603 Streambed Alteration Agreement (Section 1603 of the California Fish and Game Code).

The California Department of Transportation is responsible for issuing permits to cross or bore under state highways (Encroachment Permits).

The State Historic Preservation Office consults with the FERC, the project developer, and appropriate land management agencies regarding activities potentially affecting cultural resources. (Section 106 Consultation, National Historic Preservation Act).

### ***California Local Government Permitting and Approvals***

Section 401 of the Clean Water Act requires that any activity, including construction of a transmission line or gas pipeline, which may result in a discharge into a state water body must be certified by the appropriate Regional Water Quality Control Board,<sup>42</sup> to ensure that the proposed activity does not violate state and/or federal water quality standards.

The appropriate Regional Water Quality Control Board (e.g., San Diego or the Colorado River Basin Regional Water Quality Control Board) is responsible for approving a certificate for activities related to dredge and fill materials (Section 401, Clean Water Act, Water Quality Certification). The regional board is also responsible for issuing permits and waste discharge requirements for discharging storm waters into waters of the U.S. (National Pollutant Discharge Elimination System (NPDES) Storm Water Construction Permit). For pipelines, the water boards are responsible for issuing permits for discharging hydrostatic test water (NPDES Hydrostatic Test Permit).

The Air Pollution Control District (e.g., San Diego County or the Imperial County Air Pollution Control District) is responsible for approving a dust control plan for construction.

In some cases, local governments (city/county) may also require a conditional use permit to install a transmission line or natural gas pipeline. The requirement to obtain a conditional use permit will depend on the zoning ordinances governing the particular parcels of land on which the transmission line or pipeline will be installed. Local governments (e.g., public works departments) are also responsible for issuing encroachment permits to allow construction within local roadways.

### ***Border 2012 Framework***

The Border 2012 Framework is a 10-year, binational, results-oriented environmental program for the U.S.-Mexico border region. The “Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area” (La Paz Agreement) was signed in La Paz, Baja California Sur, Mexico, in 1983 and is the legal basis for the Border 2012 Framework. It empowers the federal environmental authorities in the U.S.

and Mexico to undertake cooperative initiatives and is implemented through multi-year binational programs. The U.S. Environmental Protection Agency and the Secretariat of Environment and Natural Resources serve as National Coordinators for these programs. The Border 2012 Framework is the latest multi-year, binational planning effort to be implemented under the La Paz Agreement.<sup>43</sup>

Although the Border 2012 Framework does not explicitly deal with energy or transmission lines, its explicit goals touch these two areas of development. Public concerns have been raised about energy facilities, including new transmission lines, proposed in the border region.

## **Electric and Natural Gas Transmission Siting Challenges and Opportunities**

Major environmental factors affecting construction of new or upgraded transmission lines and gas pipelines in the border region include land use constraints and impacts on biological and cultural resources. With respect to transmission lines, there are also concerns about impacts on visual resources.

### ***Garamendi Principles***

Senate Bill 2431 (Garamendi; Stats. 1988, Ch. 1457) specifies that planning and siting of new electric transmission lines be pursued in the following order:

1. The use of existing rights-of-way should be encouraged by upgrading existing transmission facilities where technically and economically feasible.
2. Expansion of existing rights-of-way should be encouraged whenever construction of new transmission lines is required.
3. New rights-of-way should be created when justified by environmental, technical, or economic reasons, as determined by the appropriate licensing agency.
4. Agreement among all interested utilities should be sought on efficient use of new transmission capacity whenever there is a need to construct such capacity.

The Garamendi Principles could also be applied to natural gas pipelines.

### ***San Diego County***

Siting new transmission lines in populated or rapidly growing urban areas can be difficult due to community concerns about land use incompatibility, visual impacts, and potential health risks. Finding sufficient space for transmission line rights-of-way in a densely developed area can be challenging, and potentially costly if residences need to be purchased to make space for the right-of-way. The new 35-mile Miguel-Mission

transmission line, which is being built within an existing SDG&E right-of-way, takes a circuitous route around the main urban area of the City of San Diego to connect the Miguel and Mission substations. From a land use perspective, it is generally easier to upgrade an existing transmission line or build a new line within an existing transmission line right-of-way than to create an entirely new right-of-way because no land must be converted from its current use. However, even upgrading existing lines can be challenging if incompatible land uses, such as residences, have been built along the right-of-way. While rural areas offer more space for transmission lines, the community concerns are often similar to those in urban areas and often just as difficult to resolve.

Tribal lands can pose a potential routing constraint to new transmission lines. Because tribes are federally recognized as sovereign entities, state agencies, utilities, and private developers must obtain permission from tribes to build transmission lines and towers on tribal lands. There are numerous Indian reservations in San Diego County, including the Mission Indian Reservation, Pechanga Indian Reservation, La Posta Indian Reservation, Manzanita Indian Reservation, and Campo Indian Reservation. The existing Southwest Power Link 500 kilovolt transmission line crosses the Campo Indian Reservation.

Transmission routes into San Diego County from the east, including alternative 500 kV lines being considered by the SDG&E Transmission Comparison Study Working Group, may cross the Anza Borrego Desert State Park. This vast park covers much of eastern San Diego County, stretching from nearly the California-Mexico border to the Riverside County line, with small portions extending into Riverside and Imperial counties. Covering over 600,000 acres, Anza-Borrego is the largest state park in the contiguous United States. There is an existing 69 kV transmission line through Anza Borrego. The recently-adopted General Plan for Anza Borrego states that should utility companies propose new or expanded transmission lines in Anza Borrego, the California Department of Parks and Recreation should coordinate with the utilities to ensure that the new or expanded transmission lines are sited in a manner that minimizes adverse impacts on the park, such as minimizing the visibility of the lines from important vistas. The plan also calls for removing old, obsolete facilities and restoring old utility roads.

## **Biological Resources**

Transmission lines and gas pipelines can cause the loss or degradation of critical habitat. Transmission lines can be collision and electrocution hazards to birds. Birds with long wing spans, such as raptors, are the most susceptible to electrocution. Transmission lines and gas pipelines in desert areas are of particular concern because desert habitats are slow to recover from disturbances caused by construction.<sup>44</sup>

San Diego County is a biologically diverse region.<sup>45</sup> Because of the presence of many federal and state-listed threatened or endangered species, several habitat conservation plans have been developed for the San Diego region. Habitat conservation plans, such as the San Diego Multiple Species Conservation Program, can offer some certainty during permitting (e.g., acquiring a Biological Opinion from the U.S. Fish and Wildlife

Service and an Incidental Permit/Consistency Determination from the California Department of Fish and Game). However, mitigating habitat loss or degradation can be challenging due to the expense and difficulty of providing off-site compensation.

There are numerous state-established and managed mitigation areas, banks, and conservation easement areas in San Diego County. New transmission lines and gas pipelines should avoid the following areas under the management of the Department of Fish and Game:

- Garrison Creek Conservation Easement
- Buena Vista Lagoon Ecological Reserve
- Agua Hedionda Lagoon Ecological Reserve
- La Costa Planning Area
- Vintage Creek Conservation Easement
- San Diego River Conservation Easement
- Crestridge Ecological Reserve
- Del Mar Mesa Planning Area
- Manchester Avenue Conservation Bank
- San Dieguito Lagoon Ecological Reserve

Other special areas of biological concern in the San Diego region are the Cleveland National Forest, Anza Borrego Desert State Park, and Cuyamaca Rancho State Park. The mountain wilderness areas of Anza Borrego Desert State Park are home to the endangered peninsular bighorn (desert bighorn) sheep.

There are several established federal wilderness areas in the southern and southeastern portions of San Diego County, including the Pine Creek Wilderness and Hauser Wilderness areas in the Cleveland National Forest, and the Otay Mountain Wilderness and Sawtooth Mountains Wilderness areas under the management of the BLM. Permitting new transmission lines in wilderness areas, even if they contain existing transmission lines, may be difficult if the federal jurisdiction (such as the Forest Service or BLM) determines that transmission lines are inconsistent with federal regulations and the management principles of wilderness areas.

## **Cultural Resources**

Construction of transmission lines and gas pipelines could cause impacts to cultural resources, including buildings, sites, structures, objects, and historic districts. To assess this potential, a records search of cultural resources must be conducted at appropriate regional California Historical Resource Information System locations. Pedestrian surveys of proposed rights-of-way are necessary to identify any archaeological sites or historic buildings or structures that might be affected by construction activities. Crossing federal

lands will require review under the National Historic Preservation Act (36 CFR Part 800 (Section 106)). Multiple federal agencies may be involved and one will act as the lead federal agency under National Environmental Policy Act. Completion of the Section 106 process may be lengthy and could cause delay of the project.

Native American groups and individuals need to be contacted to assist in the identification of cultural resources. The California Native American Heritage Commission must be contacted to review their sacred lands file to determine if there are currently recorded sensitive sites near a proposed transmission line. A search of the Native American Heritage Commission's sacred lands file indicates that many of the existing electric transmission lines in San Diego County may be located near Native American sacred sites. Furthermore, numerous existing transmission lines cross reservation lands, including the Rincon Indian Reservation, the La Jolla Indian Reservation, and the Santa Isabel Indian Reservation in the northern part of San Diego County, and the La Posta Indian Reservation and Campo Indian Reservation in the southeastern part of the county. Proponents of new or upgraded transmission lines and gas pipelines should consult early with Native American groups to resolve potential conflicts.

## **Visual Resources**

State Route 78 through Anza Borrego Desert State Park is an Officially Designated State Scenic Highway. State Route 78 (Anza Borrego Desert State Park Road) provides travelers with views of a pristine example of southern California low desert scenery, including interesting rock formations and blooming wildflowers and cacti in late winter.<sup>46</sup> If a proposed transmission line would be visible from State Route 78, visual impacts may be substantial. Use of standard mitigation techniques, such as using low reflective surfaces on the structures (towers or poles) and conductors, would reduce the adverse impacts of the new lines.

## ***Imperial County***

As mentioned earlier, the Imperial Valley Study Group is currently reviewing potential transmission line alternatives throughout the Imperial Valley that would bring about 2,000 MW of geothermal energy to the transmission grid by 2014. The study group may develop a program-level Environmental Impact Report covering all the transmission upgrades/routings included in its recommended plan, for purposes of satisfying the requirements of the CEQA and expediting the permitting and construction of transmission projects.

## **Land Use**

Substantial portions of Imperial County are federal lands under the management of the BLM. In 1980, the BLM adopted the California Desert Conservation Area Plan. The

California Desert Conservation Area Plan is a comprehensive land use management plan that calls for the educational, scientific, and recreational uses of public lands and resources within the California Desert Conservation Area in a manner that enhances and does not diminish the environmental, cultural, and aesthetic values of the desert and its productivity. The Energy Production and Utility Corridors Element of the California Desert Conservation Area Plan identifies utility corridors, varying in width from two to five miles, throughout the desert area covered by the plan. The BLM encourages proponents of transmission lines and gas pipelines to use the designated corridors. Applications for right-of-way grants outside of the designated corridors will require an amendment to the California Desert Conservation Area Plan. Some of the transmission line options being considered by the Imperial Valley Study Group are outside of the BLM-designated corridors; however the lines would be built within existing transmission line rights-of-way.

One electric transmission line alternative being considered by the Imperial Valley Study Group would be upgrading an existing 161 kV transmission line between the Niland and Blythe substations to a 230 kV line. Upgrading this transmission line is not a viable option as the existing line bisects the Chocolate Mountain Naval Aerial Gunnery Range and the U.S. Navy has advised that the easement for the existing transmission line will be terminated.

## **Biological Resources**

Areas of biological concern in Imperial County include:

- Department of Fish and Game mitigation lands (Tabaseca)
- The Algodones Dunes (also known as Imperial Sand Dunes Recreation Area) managed by the BLM for endangered species protection and off-highway vehicle use.
- The Sonny Bono Salton Sea National Wildlife Refuge, managed for wintering migratory waterfowl, shorebirds, and endangered species.

## **Cultural Resources**

A search of the Native American Heritage Commission's sacred lands file indicates that there may be sacred sites near several of the existing electric transmission lines in Imperial County.

## **Visual Resources**

The Circulation and Scenic Highway Element of the Imperial County General Plan identifies County Highway S-22, also known as the Borrego-Salton Seaway, as a county

scenic highway. Near County Highway S-22 is Clay Point, which is a formation ring above the flat desert shore which shows the shoreline of the pre-Columbian Lake Cahuilla. An existing transmission line running between the Salton City and Desert Shores substations crosses County Highway S-22 and passes in close proximity to Clay Point. Alternatives being considered by the Imperial Valley Study Group show this existing transmission line being upgraded to a 230 kV line.

## **Case Study**

In Appendix E is a case study of the Imperial-Mexicali 230 kV transmission lines that were constructed between the Imperial Valley Substation and the U.S. international border. The transmission lines connect to similar lines built in Mexico from Intergen's and Sempra's natural gas-fired combined-cycle power plants in Mexicali. The information presented is from the *Final Environmental Impact Statement for the Imperial-Mexicali 230 kV Transmission Lines* prepared by the U.S. Department of Energy and Bureau of Land Management.

## **Baja California, Mexico**

Energy Commission staff tried to obtain information on transmission line and gas pipeline siting constraints and associated environmental concerns in Baja California from the Mexican government and Sempra Energy Resources (given their experience with the Gasoducto Bajanorte gas pipeline and the transmission line from the Termoeléctrica de Mexicali power plant to the U.S. international border). Unfortunately, at the time of preparing this white paper, this information was not available to Energy Commission staff.

The construction and operation of the two generating units at the La Rosita Power Complex required a series of permits and approvals from various Mexican regulatory agencies. Because the two generating units have separate transmission lines (one connecting at the U.S. border and the other connecting to the power grid in Mexico), each unit had to obtain its own permits and approvals. Intergen submitted its Manifestaciones de Impacto Ambiental (equivalent to an Environmental Impact Statement) to the Instituto Nacional de Ecología on August 15, 2000. It was approved on November 15, 2000.<sup>47</sup>

The Termoeléctrica de Mexicali power plant and associated transmission line apparently required 50 permits, licenses, or other authorizations from at least eight different agencies and sub agencies of the Mexican government. The Instituto Nacional de Ecología approved the Manifestaciones de Impacto Ambiental for the Termoeléctrica de Mexicali plant on January 23, 2001.<sup>48</sup>

Construction of the Gasoducto Bajanorte pipeline by Sempra apparently resulted in the destruction of hundreds of oak and pinyon trees and their habitat. Bedrock mortars, grinding slicks, ancient encampments, and potential archaeological sites were also



destroyed. Apparently, no efforts were made to repair any of the damage caused by the clearing of the gas pipeline right-of-way.<sup>49</sup>

## Conclusions

The San Diego area is in need of major electric transmission upgrades to improve the reliability of the SDG&E transmission system and to gain access to new sources of generation, including renewable resources. How long it takes to complete this project could affect SDG&E's ability to meet its goal of supplying 20 percent of its electricity from renewable generation sources by 2010. Options for renewable generation sources include geothermal resources in the Imperial Valley (Salton Sea) or at Cerro Prieto in Baja California.

The Imperial Irrigation District faces its own constraints to connecting more geothermal generation to the California power grid. The existing connections between the Baja California electric system and the California power grid are not configured to send large amounts of power northward. Based on the SDG&E Transmission Comparison Study Working Group's assessment and other factors, the Baja California option appears questionable.

Siting new electric transmission lines and gas pipelines in the border region will be challenging. Projects will face environmental and land use constraints, as well as time-consuming approvals from a multitude of agencies on both sides of the border. Consistent with the Garamendi Principles, the planning and siting of new transmission facilities in the border region, including gas pipelines, should be pursued in the following order to minimize environmental impacts:

1. Use of existing rights-of-way by upgrading existing infrastructure where technically and economically feasible.
2. Expansion of existing rights-of-way for new infrastructure.
3. Creation of new rights-of-way only when justified by environmental, technical, or economic reasons.
4. Agreement among all interested utilities (north and south of the border) should be sought on efficient use of new transmission capacity whenever there is a need to construct such capacity.

Transmission lines and gas pipelines crossing federal lands should do so, whenever possible, within existing designated utility corridors. Where existing facilities are currently located in sensitive and/or protected areas, expanding these corridors may be more environmentally damaging than a new right-of-way.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate infrastructure working groups and policy forums of the Border 2012 Framework. Doing so will allow the state to promote the Garamendi Principles for the planning and siting of electric transmission facilities and extending their applicability to gas pipelines.
- Working with key stakeholders to ensure the siting of needed cross-border transmission and pipeline facilities in an environmentally responsible, efficient, and timely manner.
- Supporting additional exploration of whether upgrades to Comisión Federal de Electricidad transmission lines and Path 45 could meet the same needs as the 500 kV lines identified by the SDG&E Transmission Comparison Study Working Group.

# CHAPTER 4: TRANSPORTATION OF GOODS

## Introduction

Cross-border trade between California and Mexico has increased substantially since the passage of the North American Free Trade Agreement (NAFTA) in 1993. This growing trade has led to significant congestion at California ports of entry along the border between California and Mexico. This chapter evaluates current transportation-related issues involving the movement of people and goods across the border, describes the expected growth in this movement, and discusses potential solutions to the existing and anticipated traffic congestion that will increase the efficiency of this trade and reduce environmental impacts.

## Regulatory Framework

Enacted in 1991, the Intermodal Surface Transportation Efficiency Act contains guidelines that address issues on international trade, transportation, and border crossings.<sup>50</sup> Sections of the Transportation Act include discretionary funding for trade corridors, border-crossing infrastructure, and for conducting a multimodal assessment of existing and emerging international trade corridors. Funding comes from the federal treasury and is distributed to state and local agencies such as the California Department of Transportation, air quality management districts, and city and county governments.

The U.S. Department of Homeland Security administers security procedures at American ports and rail yards, employing the resources of the Transportation Security Administration, the U.S. Coast Guard, U.S. Customs and Border Protection, and the U.S. Citizenship and Immigration Service, in conjunction with the U.S. Department of Transportation's Maritime Administration and Federal Railroad Administration.<sup>51</sup>

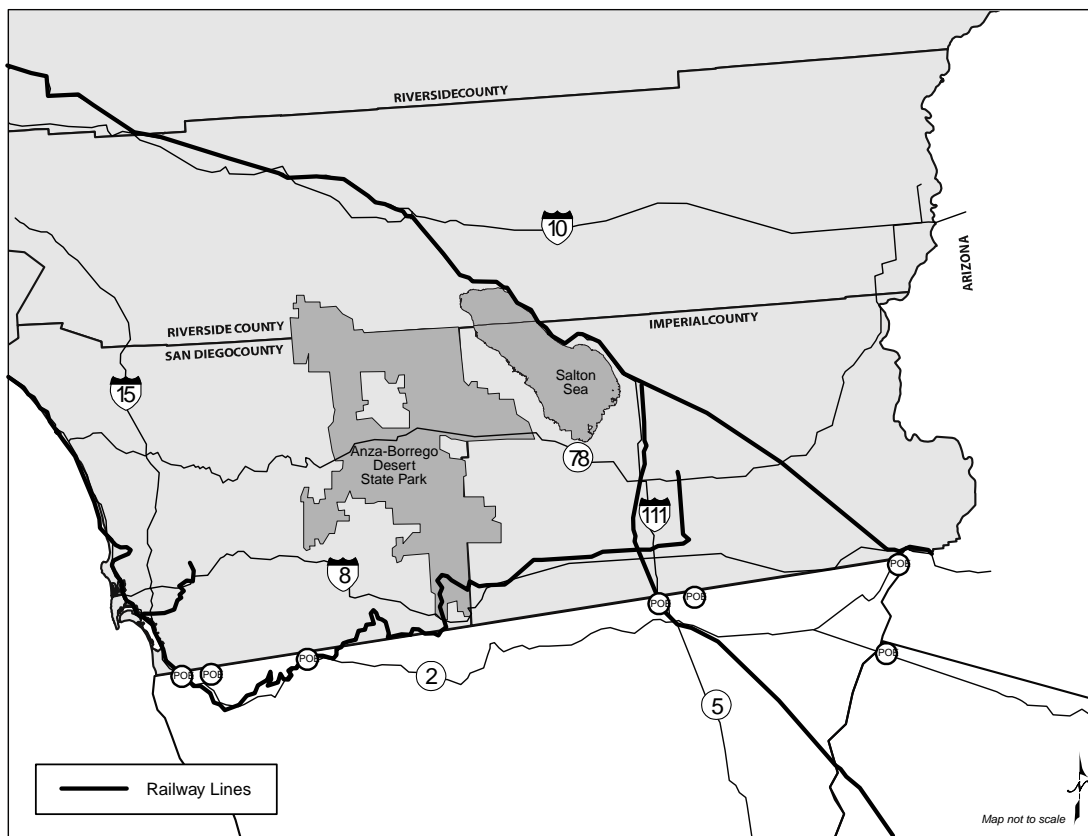
California has identified critical transportation corridors, serving trade and traffic through the land entry ports that: facilitate the movement of goods, services and information; insure a safe, efficient and secure cross-border trucking industry; and accommodate recent and anticipated growth in border-related movement. The California Department of Transportation (District 11) has conducted several studies related to trade activity and interacts with local, state, and federal transportation and planning agencies on both sides of the border.

## Existing Environmental Setting, Issues, and Trends

### Land Ports

The 150-mile border between California and Mexico contains six ports of entry (see Figure 4-1). Three of these (San Ysidro, Otay Mesa, and Tecate) are located in San Diego County, and the remaining three (Calexico, Calexico East, and Andrade) are in Imperial County. The San Ysidro port is the busiest land crossing in the world and handles the largest amount of passenger vehicle and pedestrian crossings, with forty seven million people crossing northbound in 2003.<sup>52</sup>

**Figure 4-1**  
**Ports of Entry, Major Highways, and Railroads in Border Region**

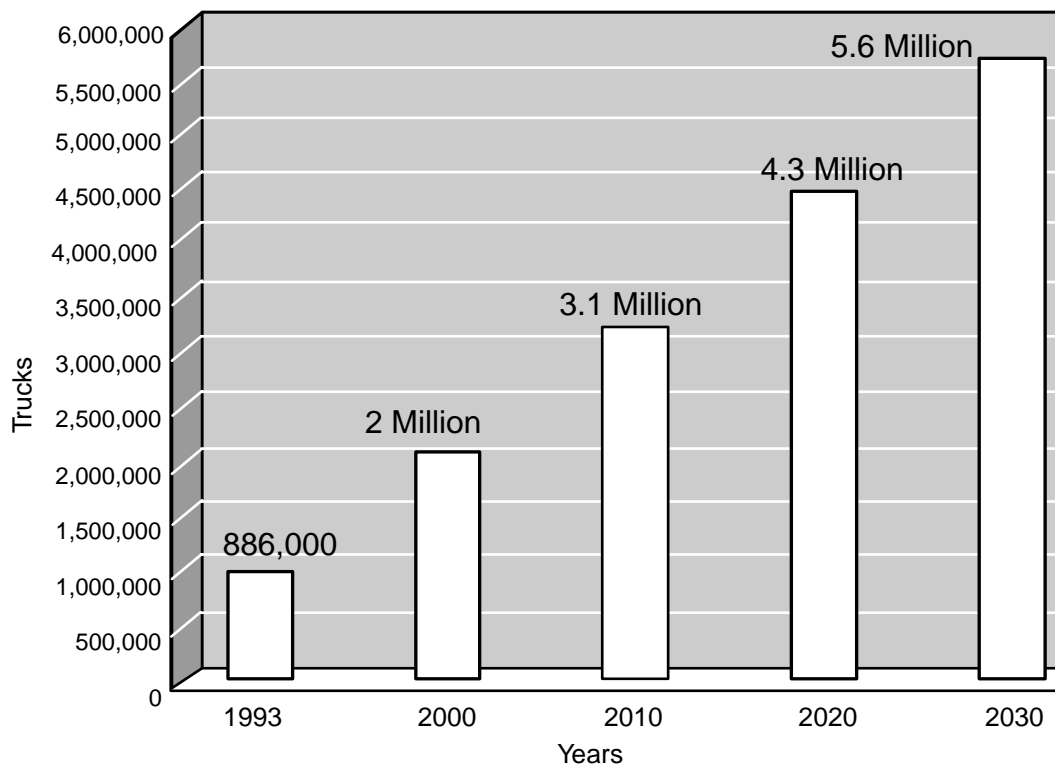


Source: California Department of Transportation – District 11

Subsequent to the passage of NAFTA, trade across the California-Mexico border has increased steadily, with Mexico surpassing Japan as California's top trade market in 1999. Total trade activity in 2003 was almost \$30 billion and it is estimated that 98 percent of this trade is transported by truck through the three main entry ports: Otay Mesa, Tecate, and Calexico East.<sup>53</sup> Truck traffic at these three ports has increased 60 percent, 77 percent, and 113 percent, respectively since 1977. The increase in truck

traffic is primarily due to the growth in the maquiladora<sup>54</sup> manufacturing and assembly plants that have increased from 178 in 1978 to nearly 900 in 2004. There were two million truck crossings at the border in the year 2003, and it is estimated that 5.6 million crossings will take place in 2030 (see Figure 4-2).

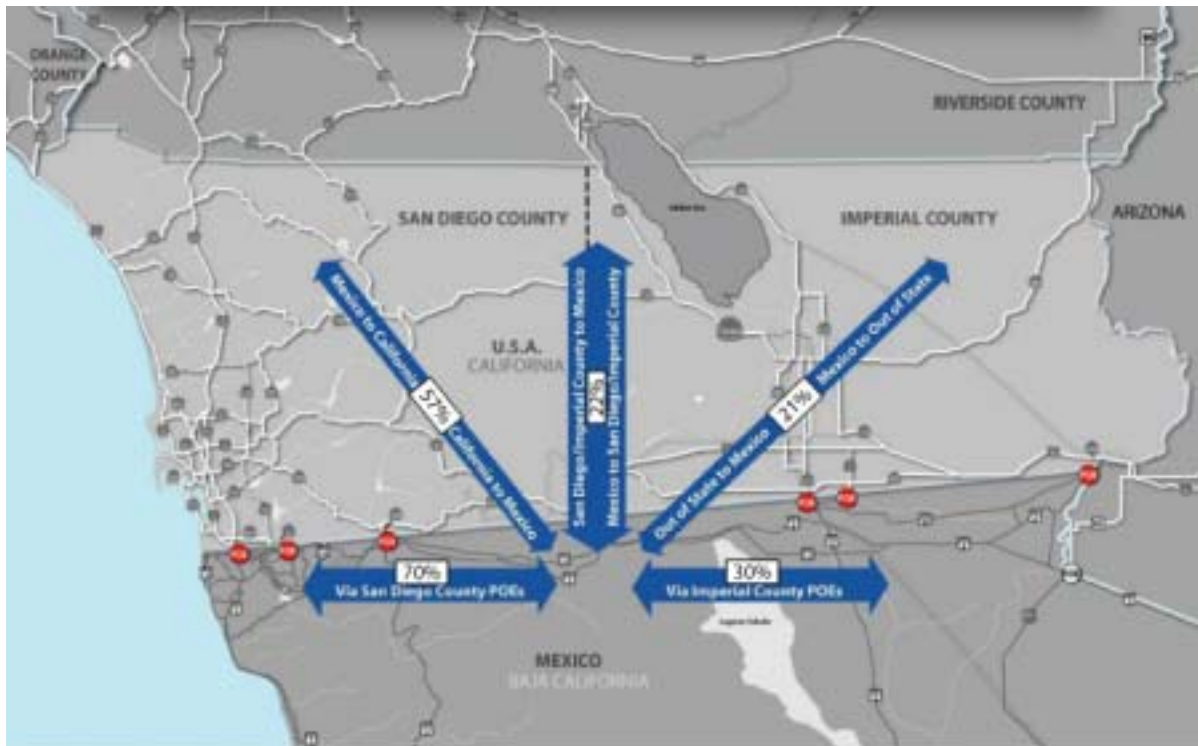
**Figure 4-2**  
**Total Annual Truck Crossings through California Ports of Entry**  
**(Northbound and Southbound)**



Source: California Department of Transportation – District 11

Much of the goods produced by the maquiladoras are high-value items such as electronics, computers, automobiles, and their components. Other goods from the border region include agricultural products from Imperial County, which are valued at \$1 billion annually, and are trucked to Mexico or shipped to Asia from the Ports of Long Beach and Los Angeles.<sup>55</sup> Approximately 78 percent of the trade transported by truck across the California-Mexico border at the three main entry ports in 1996 originated or was destined for locations outside of San Diego and Imperial counties, such as the Long Beach and Los Angeles ports or Los Angeles and Ontario airports (see Figure 4-3).<sup>56</sup> The increasing truck traffic at the border has led to congestion, environmental degradation, and longer wait times for passenger vehicles and trucks.

**Figure 4-3**  
**Distribution of Vehicles Crossing the California-Mexico Border**



Source: California Department of Transportation – District 11

## ***Marine Ports***

Marine ports in Southern California handle an enormous amount of cargo and are major sources of pollution. Large ships with engines running on the dirtiest fuel available (“bunker” or “residual” diesel), thousands of diesel truck visits per day, mile-long trains with multiple diesel locomotives hauling cargo, and other polluting equipment and activities at ports cause an array of environmental impacts that can seriously affect local communities and the regional environment.<sup>57</sup>

Much of the goods movement across the border is destined for Southern California or Baja California (State of Mexico) and will be shipped in or out of Long Beach and Los Angeles marine ports. These ports handle one-third of the total waterborne freight container traffic through U.S. ports and accounted for nearly \$200 billion in trade in 2000, as well as supporting 46,000 local jobs, 579,000 jobs in the five county region (Los Angeles, Orange, Ventura, San Bernardino, and Riverside), and 2.4 million jobs throughout the nation,<sup>58</sup> which received over \$61 billion in income. This amount of trade provided the nation with \$208 billion in economic output and generated \$16.4 billion in state and local taxes.<sup>59</sup> Fifty-to-seventy percent of the goods coming into the Long Beach/Los Angeles ports are destined for delivery to areas outside Southern California.<sup>60</sup> In 2004, the Port of Los Angeles handled 162.1 million metric tons of cargo compared

with 147.5 million tons in 2003. The two ports combined generate over 40,000 truck trips per day and this volume could exceed 50,000 by 2010.<sup>61</sup> Cargo traffic is expected to increase rapidly primarily because of consumer demand for goods made in Asia.

The Port of San Diego operates two marine terminals: the 10<sup>th</sup> Avenue Marine Terminal, and the National City Marine Terminal at 24<sup>th</sup> Street. The terminals handle approximately 2.5 million tons of cargo annually, including automobiles, produce, and bulk commodities.<sup>62</sup>

The Port of Ensenada receives 50,000 standard container units (containers) per year. Dredging operations are ongoing which will allow larger vessels to dock at the Port.<sup>63</sup> A plan is also being developed to modernize the marine and rail infrastructure at the Port of Ensenada.<sup>64</sup> The Port is being modernized to accommodate larger ships and additional rail lines. This \$40 million effort, which includes dredging activities, would increase the amount of goods shipped to Baja California. However, physical constraints at the Port of Ensenada will not allow significant expansion of cargo facilities, though there are several natural harbors further south that could be developed as ports.<sup>65</sup>

A plan for a new port was recently announced by a coalition of shipping and freight concerns.<sup>66</sup> The proposed Punta Colonet project would be located on existing farmland about 150 miles south of Tijuana, and could compete with the Long Beach and Los Angeles ports for a share of the estimated \$200 billion in annual shipping revenue. The port project would include a new rail line, roads, housing, public buildings, berths, warehouses, and cranes. Construction would take at least five years and would cost about \$1 billion. By 2012, an estimated one million standard containers could be handled a year, which is one-seventh the current volume at the Los Angeles Port.<sup>67</sup>

## ***Airports***

The San Diego International Airport is the 29<sup>th</sup> busiest airport in terms of passenger traffic. It is the only major hub airport served by a single runway, and it handles a significant amount of air cargo. In 2002, the airport accommodated 167,000 tons of air cargo. Cargo activity has been increasing at an annual average rate of 8.5 percent from 1980 to 2002. This rate is expected to decrease to 3.5 percent between 2002 and 2010 and the amount of cargo handled in 2010 is expected to be approximately 215,152 tons.<sup>68</sup> The San Diego Regional Airport Authority is currently studying options for a new airport immediately north of the border, and a proposed passenger terminal in the U.S to serve the International Airport in Tijuana.<sup>69</sup> The Airport Authority is considering several new airport alternatives, including North Island and Miramar.

## ***Railroads***

The Burlington Northern Santa Fe Railroad maintains a freight easement over 62 miles of coastal mainline owned by the North County Transit District that begins in San Diego and

proceeds north into Orange County. It carries imported cars, which are off-loaded at the Port of San Diego and also carries lumber and ash for export.<sup>70</sup> The San Diego and Arizona Eastern Railway has a rail line that begins in Santee and proceeds south through the San Ysidro entry port and east until re-entering California at the Otay Mesa entry port. Union Pacific has a rail line that begins at the Calexico entry port and proceeds north to El Centro where a spur line heads west until joining a spur of the San Diego and Arizona Eastern Railway. Union Pacific's other spur heads east and north where it terminates south of Calipatria. The San Diego/Arizona mainline continues north until it joins with another rail line coming from the Andrade entry port near Yuma, Arizona, that parallels State Route 111 to the northwest.

The Carrizo Gorge Railway, operator of the San Diego and Arizona Eastern Railway, has been refurbishing the rail line from San Diego to Imperial County described above. Service resumed in late December 2004 when a load of lumber was shipped to a furniture-making maquiladora near Tecate. It is anticipated that the refurbished rail line will stimulate increased cross-border rail deliveries.<sup>71</sup>

## **Opportunities for Environmental Improvements and Increased Efficiency in Goods Movement**

### ***Transportation System Improvement***

With passenger and commercial vehicle crossings of the California-Mexico border expected to triple by 2030, there is a need to assess opportunities to reduce congestion, improve environmental quality (i.e. air quality), and promote new technologies or activities that will allow for goods movement that benefits both California and Mexico.

A number of new and/or improved transportation facilities have been proposed to reduce congestion. In California, the Department of Transportation has identified eighteen projects in San Diego and Imperial Counties which are estimated to cost approximately \$1.5 billion. Some of the most important are:

- Interstate 5 would be realigned at San Ysidro Port of Entry.
- State Route 905 would be realigned and widened.
- State Route 125 will be constructed from State Route 905 to San Miguel Road near the Otay Mesa Port of Entry.
- State Route 11 will be constructed from State Route 905 to the border.
- The Brawley Bypass would be built to connect State Routes 78/86 to State Route 111.
- A State Route 111 expressway would connect Brawley to the Calexico Port of Entry.



- A commercial vehicle enforcement facility would be built at Interstate 8/Winterhaven near the Andrade Port of Entry.

These projects will improve movement, access, and safety along the California and Baja California, Mexico border.<sup>72</sup>

Transportation projects are also planned for Baja California. The State of Baja California Secretariat of Infrastructure and Urban Development has identified fourteen projects. These include the following:

- Construction is underway on the Tijuana 2000 Corridor which will connect Mexico Highway 2 from the Tecate Port of Entry to Rosarito on the coast.
- Construction is also underway on the Ensenada Bypass.
- A number of commercial road improvements are scheduled for Mexicali, Tijuana, Tecate, and Ensenada.
- Additional right-of-way and construction activities are planned near the Otay Mesa Port of Entry.
- Two projects are proposed to expand the Tecate Port of Entry.
- Road widening is taking place from Mexicali to San Luis and from Mexicali to San Felipe.

These projects will substantially improve the region's border transportation network and facilities and represent Mexico's commitment to improving transportation adjacent to the entry ports to address current and future transportation needs for both passenger and commercial travel.<sup>73</sup>

In addition to the projects listed above, planning is underway to develop a new port of entry at Jacumba-Jacume in eastern San Diego County. Population and employment within the municipality of Tecate is expected to increase substantially by the year 2020. A new entry point could divert between 1,500 and 5,900 vehicles per day from the Tecate entry port and could accommodate future growth in Baja California along the Tecate-Mexicali highway corridors.<sup>74</sup>

### ***Expedited Inspections at Border Crossing***

In order to improve the flow of traffic at the entry ports, two programs are being implemented: the Secure Electronic Network for Travelers Rapid Inspection program, and the Free and Secure Trade program. The Secure Electronic Network for Travelers Rapid Inspection program uses Automatic Vehicle Identification technology to identify travelers who, based on extensive record checks, are considered low risk individuals so they can be screened and approved quickly every time they enter the United States. The Free and Secure Trade program involves industrial, trade and commerce entities who can qualify by enhancing the security of their manufacturing plants, warehouses and shipping

systems. By using special seals approved by the U.S. Customs Service, trucks can cross the border more quickly. The program was implemented in the fall of 2004. The environmental benefits of expedited border crossings include reduced truck and car exhaust emissions which will improve air quality at the border, and more efficient fuel use by reducing vehicle-idling and stop-and-go traffic.

### ***Transportation Mode Shifts and Cleaner Fuels***

One of the most important issues in transporting goods from coastal ports is the decision to move the cargo by truck or rail. For example, rail shipment is more fuel-efficient. For every gallon of fuel, rail provide 455 ton-miles (ton-miles measure the movement of one ton of cargo one mile) while trucks provide only 105, which means that trucks burn at least four times as much fuel as rail to move an equivalent amount of cargo. Rail also reduces costs for freight delivery. Freight movement costs range from 1 to 3 cents per ton-mile for rail freight compared to 5 to 8.5 cents for delivery by truck. Moreover, the societal costs directly associated with air pollution are estimated as eight times as high for truck use as for rail.<sup>75</sup>

There are transportation options that can reduce both congestion and emissions at the border.

- Upgrade rail lines at the border to allow goods to be shipped more efficiently and reduce the amount of truck traffic.
- Replace older trucks and locomotives with newer models that are more efficient and cleaner.
- Require trucks and locomotives to use ultra low sulfur diesel fuel.
- Use trucks and locomotives that can be fueled with compressed or liquefied natural gas, liquefied petroleum gas, or alternative diesel fuels (i.e. synthetic diesel, biodiesel, or E-diesel (contains ethanol)).

Alternative fuel vehicles are becoming more common as emission reduction and petroleum reduction efforts are mandated by local, state and federal agencies. For example, the U.S. Environmental Protection Agency has established an aggressive timetable for the rail industry to reduce locomotive emissions 62 percent by 2005.<sup>76</sup> In response, Union Pacific Corp. and Railpower Technologies are developing a hybrid electric-and-diesel locomotive called the “Green Goat”. This locomotive is a so-called “switcher” used to move train cars from one to track to another at the Roseville rail yard north of Sacramento. It is powered by 30 custom-designed 20-volt lead-acid batteries that drive the traction motors and are recharged by a small diesel engine. Railpower claims that the Green Goat can reduce nitrogen oxide and particulate emissions by 85 percent and decrease fuel consumption by 35 percent.<sup>77</sup>

With respect to marine port operations, emission-control retrofits for existing ship engines are available using new technologies such as selective catalytic reduction, intake air

humidification, water injection, advanced fuel injectors, and cylinder lube oil control technologies. Another option for reducing emissions is the use of shore power (cold ironing) where the connection of landside electrical power to a cargo ship allows the diesel (or steam) engines to be shut down.<sup>78</sup> This would require 3 to 15 MW transformers to meet varying voltage requirements, and flexible connections for docked vessels.<sup>79</sup> Building rail lines on to the docks (rail-docks) and berths will allow for cargo offloading from the ship to the train without using trucks. This is now common practice at larger terminals.

The major barrier to implementing these various options is the capital costs related to purchasing newer trucks or locomotives or upgrading rail lines and port facilities. Cross-border coordination between agencies and commercial and industrial businesses will be essential to implement the measures mentioned above.

## Conclusions

The transportation of people and goods between California and Mexico is a major stimulator for both economies. Cross-border traffic has increased substantially since the passage of the North American Free Trade Agreement, and projections indicate that trade could triple by 2030. Current methods of moving goods are causing growing congestion and adversely affecting the environment. The vast majority of the goods movement is by truck.

Opportunities exist for improving transportation facilities near the border, including new ports of entry that would improve the efficiency of moving goods and reduce environmental impacts. Relying more on existing rail lines, or building new rail lines, can reduce projected increases in truck traffic while increasing efficiency. Use of more efficient locomotives or locomotives powered by cleaner fuels offer environmental benefits and reduced petroleum dependence. The use of rail-dock facilities can enhance goods movement at ports.

The next step in analyzing cross-border goods movement will require more information about transportation infrastructure and planning in Baja California, including potential rail line and airport expansion and cargo processing at new ports on the West Coast of Baja.

The staff suggests that the IEPR Committee consider the following:

- Participating in the appropriate transportation-related groups and policy forums of the Border 2012 Framework. Being involved in these groups will enable better coordination among all stakeholders.
- Promoting more efficient trucks and locomotives, the use of ultra low sulfur diesel and alternative fuels, and transporting more cargo by rail to improve air quality and reduce petroleum dependence.

- Working with the Baja California Secretariat of Infrastructure & Urban Planning to share information regarding future transportation and goods movement projects including potential rail line and airport expansion and cargo processing at new ports on the West Coast of Baja.

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- <sup>25</sup> See [http://www.cpuc.ca.gov/Environment/info/aspen/miguel\\_mission/miguelmission.htm](http://www.cpuc.ca.gov/Environment/info/aspen/miguel_mission/miguelmission.htm)
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- <sup>62</sup> Draft Goods Movement, pg. V.-14
- <sup>63</sup> Ibid, pg IV. -7.
- <sup>64</sup> California/Mexico Border Briefing, pg. 3-62.
- <sup>65</sup> Personal Communication with Erik Neandross, Partner, Gladstein, Neandross & Associates, and James Adams, California Energy Commission, on April 1, 2005.
- <sup>66</sup> Shipping freight firms planning large port in Baja. Sacramento Bee, April 10, 2005.
- <sup>67</sup> Ibid, pg. 24.
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- <sup>69</sup> Mobility 2030 – The Transportation Plan for the San Diego Region. SANDAG, Final Report, April 2003.
- <sup>70</sup> Ibid, pg. V.-14.
- <sup>71</sup> California/Mexico Border Briefing. pg. 3-45.
- <sup>72</sup> California/Mexico Border Briefing, pg. v.
- <sup>73</sup> Ibid, pg. 3-61.
- <sup>74</sup> Ibid, pg. 3-49
- <sup>75</sup> Harboring Pollution, pg. 52.
- <sup>76</sup> Train Makers Race Clock to Find Ways to Cut Locomotive Pollution. The Wall Street Journal, October 23, 2002.
- <sup>77</sup> Ibid, pg. B13.
- <sup>78</sup> Draft Goods Movement, pg. VI. - 10
- <sup>79</sup> Harbor Pollution, pg. 22.

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# APPENDIX A: CALIFORNIA, UNITED STATES AND MEXICAN AMBIENT AIR QUALITY STANDARDS

| Pollutant                            | Averaging Time   | California Standard          | United States Standard       | Mexican Standard            |
|--------------------------------------|------------------|------------------------------|------------------------------|-----------------------------|
| Ozone                                | 1 Hour           | 0.09 ppm                     | 0.12 ppm                     | 0.11 ppm                    |
|                                      | 8 Hour           | -                            | 0.084 ppm                    | -                           |
| Carbon Monoxide                      | 1 Hour           | 20 ppm                       | 35 ppm                       | -                           |
|                                      | 8 Hour           | 9 ppm                        | 9 ppm                        | 11 ppm                      |
| Nitrogen Dioxide                     | 1 Hour           | 0.25 ppm                     | -                            | 0.21 ppm                    |
|                                      | Annual Average   | -                            | 0.053 ppm                    | -                           |
| Sulfur Dioxide                       | 1 Hour           | 0.25 ppm                     | -                            | -                           |
|                                      | 3 Hour           | -                            | 0.5 ppm                      | -                           |
|                                      | 24 Hour          | 0.04 ppm                     | 0.14 ppm                     | 0.13 ppm                    |
|                                      | Annual Average   | -                            | 0.03 ppm                     | 0.03 ppm                    |
| Respirable Particulate Matter (PM10) | 24 Hour          | 50 $\mu\text{g}/\text{m}^3$  | 150 $\mu\text{g}/\text{m}^3$ | 150 $\text{g}/\text{m}^3$   |
|                                      | Annual Mean      | 20 $\text{g}/\text{m}^3$     | 50 $\mu\text{g}/\text{m}^3$  | 50 $\mu\text{g}/\text{m}^3$ |
| Fine Particulate Matter (PM2.5)      | 24 Hour          | -                            | 65 $\text{g}/\text{m}^3$     | -                           |
|                                      | Annual Mean      | 12 $\text{g}/\text{m}^3$     | 15 $\text{g}/\text{m}^3$     | -                           |
| Total Suspended Particulate          | 24 Hour          | -                            | -                            | 260 $\text{g}/\text{m}^3$   |
| Sulfates                             | 24 Hour          | 25 $\mu\text{g}/\text{m}^3$  | -                            | -                           |
| Lead                                 | 30 Day Average   | 1.5 $\mu\text{g}/\text{m}^3$ | -                            | -                           |
|                                      | Calendar Quarter | -                            | 1.5 $\mu\text{g}/\text{m}^3$ | 1.5 $\text{g}/\text{m}^3$   |
| Hydrogen Sulfide                     | 1 Hour           | 0.03 ppm                     | -                            | -                           |
| Vinyl Chloride (chloroethene)        | 24 Hour          | 0.010 ppm                    | -                            | -                           |

Source: SCERP 2004 & California Air Resources Board Website

## APPENDIX B: MAJOR STAKEHOLDERS – AIR QUALITY

There are hundreds of entities (both public and private), agreements, working groups, and other interested organizations on either side of the border working to influence air quality policy in the border region. This is a summary of some of the major stakeholders, which should hopefully serve to emphasize the magnitude and scope of the effort currently underway.

### Government Agencies – United States

U.S. Environmental Protection Agency (EPA) - EPA Region IX co-chairs the Border 2012 Framework addressing border region air quality, public health, water quality, waste treatment, pesticide management, and hazardous/solid waste issues. In October 1994, EPA established the Border Liaison Office in San Diego, California to support binational efforts that address environmental issues affecting U.S.-Mexico border communities.

California Air Resources Board (ARB) - ARB is working with EPA Region IX in the development of air quality management plans for the border region, a “Smog Check” pilot program in Tijuana, and maintenance of air monitoring stations in Tijuana, Mexicali, and Tecate. EPA Region IX currently funds the ambient monitoring program.

California Environmental Protection Agency (Cal/EPA) - Cal/EPA coordinates the California-Baja California Border Environmental Program (BEP), in which each of its agencies has border-related activities. Some of these agencies also participate in EPA’s Border 2012 program. Cal/EPA’s BEP web page provides annotated lists of California and federal agencies, and their Mexican counterparts that work as partners with Cal/EPA on border programs.

U.S. Department of Energy (DOE) - DOE issued Presidential permits to Baja California Power (an Intergen subsidiary) and Sempra Energy Resources to separately construct double circuit 230-kV transmission lines across the U.S.-Mexico border from Baja California to Imperial County. These transmission lines and related power plants (La Rosita and Termoelectrica de Mexicali) were very controversial, particularly regarding air and water impacts. The permits were the subject of litigation filed by the Border Power Plant Working Group, resulting in a new Environmental Impact Statement (EIS) finalized by DOE in December 2004 (DOE/EIS-0365).

U.S. DOE Office of Energy Assurance (DOE/EA) - The DOE/EA established and staffed the Energy Information Sharing, Coordination, and Analysis Group (ISCG) at the National Infrastructure Protection Center (NIPC). The DOE/EA staff works with the Office of Homeland Security on the potential for terrorist threats, including implementation of the *Smart Border Declaration*. This Declaration was an agreement made by President Bush

and Mexican President Vicente Fox to cooperate on cross-border planning for the protection of key infrastructure, including energy facilities.

Western Governors' Association (WGA) - A state and federally funded organization based in Denver, CO, providing research and policy coordination for 10 western U.S. states. Its Border Environment Dialogue Project, which is funded by EPA, creates opportunities for U.S. and Mexican state/federal officials to work together on cross-border health, environmental, and natural resource issues.

Border Legislative Conference - A joint program of the Council of State Governments (CSG) - *WEST* and its regional partner in the South, the Southern Legislative Conference (SLC), aimed at enhancing collaboration and communication among state legislators of the United States and Mexico. The goal of the project is to empower border state legislators to engage in the binational agenda and provide input and direction in the development of policy between both countries. Financial support of the program is provided by a grant from the United States Agency for International Development (USAID).

Western Regional Air Partnership (WRAP) - A collaborative effort of tribal governments, state governments and various U.S. federal agencies to implement the Grand Canyon Visibility Transport Commission's recommendations and to develop the technical and policy tools needed by western states and tribes to comply with the EPA's regional haze regulations. WRAP is administered jointly by the Western Governors' Association and the National Tribal Environmental Council.

Office of Cooperative Environmental Management (OCEM) - OCEM serves as the secretariat for all of EPA's federal advisory committees, including the Good Neighbor Environmental Board (GNEB), which offer recommendations to the EPA Administrator and other senior officials, seemingly focused on the U.S.-Mexico border. It publishes a periodic newsletter, the *Good Neighbor Environmental Board Roundup*, with items on various border-related topics, and a border region calendar listing federally sponsored events, and some non-federal events.

U.S. Bureau of Land Management (BLM) El Centro Office - The BLM's El Centro staff issued right-of-way grants in Imperial County for transmission lines originating at two recently built power plants in the Mexicali area of Mexico. These power plants and the two related 230 kV transmission lines have been very controversial, particularly with respect to air and water impacts in Imperial County. (see U.S. DOE above).

Office of Environmental Health Hazard Assessment (OEHHA) - OEHHA works with public agencies and various interest groups on both sides of the border on health risk assessment issues and projects. OEHHA also participates in the Barrio Logan project to assess air contaminants, and conduct community health worker training on Lead Poisoning Prevention.

Integrated Waste Management Board (IWMB) - Waste Board activities in the border region include environmental education for K-12 teachers, and working with the City of Tijuana in its efforts to site a new landfill.

## **Government Agencies - Mexico**

SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales) - The multi-disciplinary, Mexican federal equivalent of EPA, whose purpose is to create a national environmental protection policy reversing ecological deterioration and establishing the basis for sustainable development.

PROFEPA (Procuraduria Federal de Protección al Ambiente) - A subdivision of SEMARNAT, appears frequently in news clips and references to various border meetings. PROFEPA is an arm of SEMARNAT that is responsible for enforcing Mexican environmental laws.

Comisión Reguladora de Energía (CRE) - Roughly the Mexican federal equivalent of U.S. Federal Energy Regulatory Commission. CRE also has some research and development activity similar to that of other sections within the U.S. Department of Energy.

Comisión Federal de Electricidad (CFE) - The federally owned and managed electric utility in Mexico.

## **Government Agencies - Binational**

U.S. Mexico Binational Commission (BNC) - The Binational Commission was established in 1981 by Presidents Reagan and Lopez Portillo to serve as a forum for meetings between cabinet-level officials from both countries. The BNC was envisioned as a simple, flexible tool that would meet once or twice annually with U.S. and Mexican counterparts addressing topics requiring high-level attention.

## **Programs, Frameworks, Workgroups and Non-Government Organizations**

The La Paz Agreement - An agreement between the United States and Mexico, signed on August 14, 1983. It deals with cooperation on the border and serves as the legal basis for much of the subsequent cooperation on environmental issues. La Paz defines the border region as extending 100 kilometers (km) north and south of the border itself. The formal title of the agreement is "The Agreement Between the United States of America and the United States of Mexico on Cooperation for the Protection and Improvement of the Environment in the Border Area".

Border 2012 Framework - A binational program based on the La Paz Agreement and founded by the EPA and SEMARNAT, in cooperation with ARB, the Mexican Secretariat of Health (SS), the governments of all 10 border states, border air quality management districts and environmental agencies, and nearly all other public and private stakeholders interested in border environmental policy. The program emphasizes a bottom-up, regional approach, anticipating that local decision-making, priority-setting, and project implementation will best address environmental issues in the border region. It hosts workgroup meetings that bring together a wide variety of stakeholders to produce prioritized and sustained actions that consider the environmental needs of the different border communities (EPA 2003a, EPA 2005).

Southwest Consortium for Environmental Research and Policy (SCERP) - A collaboration of five U.S. and five Mexican universities located in the border region. SCERP has the multi-fold mission of applied research, outreach, education, policy development, and regional capacity building for communities. Since its inception in 1989, SCERP has implemented about 400 research projects with the stated goal of informing the decision-making process without advocating for or against a particular position.

Border Environment Cooperation Commission (BECC)/Comision de Cooperacion Ecológica Fronteriza (COCEF) - A binational commission created by the North American Free Trade Agreement (NAFTA) and the related North American Agreement on Environmental Cooperation (NAAEC). BECC was established to assist impoverished border communities with planning and financing (through NADBank, see below) for environmental infrastructure projects, primarily in the areas of drinking water, sewerage, sanitation, and municipal solid waste management. Recent reforms have given the commission increased latitude to delve into other types of environmental projects. Those new areas include air quality, water conservation, energy efficiency in public and industrial buildings, and clean energy production, such as wind-generated electricity.

North American Development Bank (NADBank) - NADBank is the financing arm of the Border Environment Cooperation Commission (BECC) for environmental infrastructure projects such as water treatment plants in the border region. It also administers grants from the U.S. Environmental Protection Agency. As of mid 2004 the NADBank had provided approximately \$660 million for 79 public works projects in the border region (TCEQ 2004). NADBank is not currently funding any air quality improvement initiatives, but may either fund or initiate such programs in the future (SCERP 2004, p. 61).

North American Agreement on Environmental Cooperation (NAAEC) - One of two side agreements to NAFTA (the other a labor cooperation agreement), was signed by Canada, Mexico and the United States in August 1993 and came into force on January 1, 1994. The NAAEC was developed to support the environmental provisions of the NAFTA by establishing a level playing field with a view to avoiding trade distortions and promoting environmental cooperation (NAAEC-CO 2003).

Binational Energy Forum (a.k.a. Binational Energy Working Group) - The San Diego Association of Governments (SANDAG) contracted with San Diego State University (SDSU) in 2002 to develop a group for analyzing binational energy sectors, and lay out issues to be addressed by local governments and stakeholders on both sides of the border.

Border Power Plant Working Group - A non-profit working group advocating for the development of environmentally sustainable energy facilities in the US-Mexico border region.

Border Energy Strategy Committee (BESC) - This Committee is a joint project of SANDAG, SDSU, SCERP, San Diego Regional Energy Office (SDREO), and the *Universidad Autonoma de Baja California*. BESC was formed to develop strategies and recommendations related to the growing integration of the energy sectors of California and Baja California. The group issued a report in November 2002, "Energy Issues in the California-Baja California Binational Region", which was directed towards local elected officials and other decision makers concerned about energy issues in the border region.



## APPENDIX C: AVERAGE ANNUAL WATER USE AND COOLING METHODS OF EXISTING AND PROPOSED BORDER POWER PLANTS

| Power Plant Name                | Capacity (MW) | Location         | Production Technology  | Cooling Method              | Avg. Annual Water Supply (AF) | Avg. Annual Wastewater Discharge (AF) | Avg. Annual Water Consumed (AF) | Water Source         |
|---------------------------------|---------------|------------------|------------------------|-----------------------------|-------------------------------|---------------------------------------|---------------------------------|----------------------|
| Imperial Resource Recovery      | 18.1          | Imperial County  | Biomass                | Wet                         |                               |                                       |                                 |                      |
| El Centro Units 2-1, 2-2, 3 & 4 | 233           | Imperial County  | Steam & Combined Cycle | Wet                         | 820                           | 180                                   | 640                             | Colorado River (IID) |
| Various Geothermal Plants       | 553           | Imperial County  | Geothermal             |                             |                               |                                       |                                 |                      |
| Salton Sea #6 (proposed)        | 185           | Imperial County  | Geothermal             | Wet                         | 293                           | 0                                     | 293                             | Colorado River (IID) |
| Various Gas Combustion Turbines | 73            | Imperial County  | Simple Cycle           | Wet – Turbine Inlet Cooling | Est. 200                      |                                       |                                 |                      |
| Various Hydroelectric           | 63            | Imperial County  | Hydraulic Turbine      | N/A                         |                               | N/A                                   | 0                               | All American Canal   |
| Blythe Energy I                 | 520           | Riverside County | Combined Cycle         | Wet                         | 3,300                         | 0                                     | 3,300                           | Colorado River       |
| Blythe Energy II (proposed)     | 520           | Riverside County | Combined Cycle         | Wet                         | 3,300                         | 0                                     | 3,300                           | Colorado River       |
| Inland Empire                   | 670           | Riverside County | Combined Cycle         | Wet                         | 4,200                         | 800                                   | 3,400                           | Reclaimed Water      |
| Indigo 1, 2 & 3                 | 135           | Riverside County | Simple Cycle           | Wet – Turbine Inlet Cooling | 300                           | 0                                     | 300                             | Municipal Water      |
| Colmac (aka Mecca)              | 49.9          | Riverside County | Biomass                | Wet                         |                               |                                       |                                 |                      |
| Various Wind                    | 368           | Riverside County | Wind                   | N/A                         | 0                             | 0                                     | 0                               | N/A                  |
| Various Hydroelectric           | 24            | Riverside County | Hydraulic Turbine      | N/A                         |                               | N/A                                   | 0                               | Various              |
| San Onofre                      | 2,254         | San Diego        | Nuclear                | Once-Thru                   | 2,883,000                     | 2,883,000                             | 0                               | Pacific Ocean        |
| Encina                          | 965           | San Diego        | Steam & Gas Turbine    | Once-Thru                   | 2,850,000                     | 2,850,000                             | 0                               | Pacific Ocean        |
| Encina                          |               | San Diego        |                        | Process Water               | 220                           | 180                                   | 40                              | Municipal Water      |

|  |       |           |                         |                             |            |         |       |                                     |
|--|-------|-----------|-------------------------|-----------------------------|------------|---------|-------|-------------------------------------|
| South Bay  | 693   | San Diego | Steam turbine           | Once-Thru                   | 672,000    | 672,000 | 0     | San Diego Bay                       |
| Palomar (proposed)   | 546   | San Diego | Combined Cycle          | Wet                         | 3,600      | 600     | 3,000 | Reclaimed Water                     |
| Otay Mesa (Under Construction)   | 510   | San Diego | Combined Cycle          | Dry                         | 400        | 150     | 250   | Municipal Water                     |
| Various Gas Combustion Turbines  | 487   | San Diego | Simple Cycle            | Wet – Turbine Inlet Cooling | Est. 1,000 |         |       | Municipal Water                     |
| Various Cogen's  | 284   | San Diego | Recip. Engine/ Gas Turb |                             |            |         |       |                                     |
| Various Hydroelectric  | 14    | San Diego | Hydraulic Turbine       | N/A                         |            | N/A     | 0     | Various                             |
| Various Waste to Energy  | 11    | San Diego | Recip. Engine           | N/A                         |            |         |       |                                     |
| Various Solar Photovoltaic   | 8.6   | San Diego | Solar                   | N/A                         | 0          | 0       | 0     | N/A                                 |
| <b>Subtotal of Colorado River Water Use by Power Plants in Imperial, Riverside, and San Diego Counties</b> |       |           |                         |                             | 7,700      |         |       |                                     |
| Termoelectrica de Mexicali (TDM)   | 600   | Mexicali  | Combined Cycle          | Wet                         | 3,700      | 1,400   | 2,300 | Primary - Treated Wastewater        |
| La Rosita Power Complex (LRPC)   | 1,060 | Mexicali  | Combined Cycle          | Wet                         | 7,660      | 2,900   | 4,760 | Raw or Primary - Treated Wastewater |
| Rosarito   | 1,000 | Rosarito  | Steam & Gas Turbines    | Once-thru & Wet             |            |         |       |                                     |
| Cerro Prieto   | 720   |           | Geothermal              |                             |            |         |       |                                     |
| Ensenada   | 50    | Ensenada  | Steam Turbine           | Once-thru                   |            |         |       |                                     |

Note: The highlighted (shaded) power plants are those projects in the region that can best conserve surface and ground water supplies and avoid degrading water quality.

N/A = Not Applicable

# APPENDIX D: SALTON SEA LOCAL RESTORATION PLAN



## **APPENDIX E: CASE STUDY: IMPERIAL-MEXICALI 230 KV TRANSMISSION LINES**

The following discussion of the Imperial-Mexicali 230 kV Transmission Lines is intended to illustrate the permitting process (in this case a contested one) for international transmission lines and some of the potential environmental impacts of proposed transmission lines in the border region.

### **Federal Authorizations and Subsequent Lawsuit**

On February 27, 2001 and March 7, 2001, respectively, Baja California Power, Inc., InterGen Aztec Energy, V.B.V. and Sempra Energy Resources filed applications with the U.S. Department of Energy (DOE) for Presidential permits for two 230-kV transmission lines extending from the Imperial Valley Substation in California to a point west of Calexico at the U.S.-Mexico border. The proposed lines would connect at the border with similar lines being built in Mexico and running from InterGen's La Rosita Power Complex and Sempra's Termoeléctrica de Mexicali, two natural gas-fired combined-cycle power plants in Mexicali, Mexico. The proposed lines would run parallel to one another and parallel to the existing SDG&E Imperial Valley-La Rosita line,<sup>79</sup> traversing land managed by the U.S. Bureau of Land Management (BLM) in Imperial County. The portion of the Imperial Valley-La Rosita transmission line south of the U.S.-Mexico border is owned by CFE.

The DOE and BLM originally determined that the appropriate level of review under the National Environmental Policy Act (NEPA) for the Presidential permit applications was an Environmental Assessment (EA). The DOE and BLM prepared a single EA that assessed the environmental impacts in the U.S. of the proposed transmission lines and the two related Mexicali power plants.

The EA was completed and issued in December 2001. The DOE relied on the EA to issue a Finding of No Significant Impact (FONSI) and Presidential permits for both projects on December 5, 2001. The BLM issued two FONSIs on December 19, 2001, and two Decision Records to issue the right-of-way grants to allow InterGen and Sempra to construct and maintain the transmission lines on BLM land. Following the authorizations, InterGen and Sempra constructed the lines and began exporting electricity from Mexico in July 2003.

On March 19, 2002, the Border Power Plant Working Group sued the DOE and BLM in the United States District Court for the Southern District of California, alleging violations of the NEPA and the Administrative Procedure Act. The Working Group sought to have the EA, the FONSIs, the Presidential permits, and the right-of-way grants determined to be illegal and requested an injunction forbidding the use of the transmission lines. On May 2, 2003, the District Court held that the EA and FONSIs did not comply with the

NEPA, and on July 8, 2003, ordered the DOE and BLM to conduct another environmental review. The court allowed InterGen and SEmpra to continue operating the transmission lines, deferring a decision on the fate of the Presidential permits and the FONSIIs until July 1, 2004, or until such time as superseding environmental documents were issued, whichever was earlier.

## **Environmental Consequences**

The DOE and BLM again chose to consider both transmission lines in the same Environmental Impact Statement (EIS), and based on instructions from the court, the agencies conducted the new environmental review as if the transmission lines had not been built.

The Draft EIS was issued in May 2004. The Final EIS was issued in December 2004.

Some of the potential environmental consequences of transmission lines discussed in the Final EIS are listed below.

### ***Biology***

- The transmission lines would cause temporary and permanent impacts to Sonoran creosote bush scrub and desert wash habitat adjacent to the existing SDG&E transmission line route.
- While bald eagles, a federally threatened and state endangered species, could occur within the vicinity of the proposed transmission line routes, it is relatively unlikely because suitable foraging areas (i.e., open bodies of water containing fish) are not located nearby. Electrocution would be highly unlikely because the spacing between the conductors would be considerably greater than the wingspan of a bald eagle. There is a potential for isolated deaths through collision with the conductors. However, the existing SDG&E transmission line has been in place for approximately 20 years, and no bald eagle deaths due to the presence of the line have been reported during that time. Because the spacing between the conductors and ground wire on the top of the towers exceeds the wing span of the bald eagle (the largest raptor that could occur in the area), no electrocution impacts to other raptors are anticipated.
- Construction of the transmission lines would not impact any plants or animals federally listed as threatened or endangered, but could potentially destroy some plant species considered sensitive by the California Native Plant Society. These impacts could occur as a direct result of construction activities or as an indirect impact if invasive plants were accidentally introduced.

- Some habitat for the flat-tailed horned lizard and burrows of the western burrowing owl (BLM-designated species of concern) could be lost. However, the implementation of mitigation procedures for these species during the construction phase would minimize the potential for individuals being killed.
- The area in which the transmission lines would be constructed is located within the Yuha Basin Area of Critical Environmental Concern and the Yuha Desert Management Area for the flat-tailed horned lizard, a species of special interest to the BLM. InterGen and Sempra agreed to mitigation measures to minimize impacts to the flat-tailed horned lizard, the western burrowing owl, and other species that the BLM considers sensitive biological resources. Mitigation includes scheduling construction to occur as much as possible during the flat-tailed horned lizard's hibernation period from approximately November 15 to February 15. Assuming that the specified actions are implemented during construction, no unacceptable impacts to the flat-tailed horned lizard are anticipated as a result of the proposed action.
- No wetlands would be affected by the proposed projects within the transmission line routes, but a total of 0.21 acre of desert wash areas, which are considered to be Waters of the U.S. under the jurisdiction of the U.S. Army Corps of Engineers through Section 404 of the Federal Clean Water Act (i.e., navigable waters), would be affected along the proposed transmission line routes. This impact would result from placement of tower footings and access roads in the desert wash areas, including Pinto Wash. These projects would not require a permit from the U.S. Army Corps of Engineers because Nationwide Permit No. 12 covers projects that do not exceed 0.50 acre of impacts to wetlands.

## ***Cultural Resources***

- The BLM sent letters to the appropriate Tribal organizations asking if they had any concerns with the proposed projects. Native American organizations did not respond to these letters; therefore, no concerns were identified.
- A cultural resources survey was conducted for the proposed transmission line routes to ascertain if any cultural resources are present. The survey discovered nine previously recorded sites and recorded 18 new sites and 34 isolated artifacts. All but one of the sites appear to be from the prehistoric period and are likely related to Lake Cahuilla. The historic period site dates to the 1930s. Twenty-three of these sites have been recommended as eligible for listing on the National Register of Historic Places.
- The proposed transmission line routes would require the construction of lattice towers within the boundaries of four archaeological sites deemed eligible for inclusion in the National Register of Historic Places by the California State Historic Preservation Officer, resulting in the unavoidable destruction of portions of these sites. A treatment plan for the four potentially eligible sites was developed and

approved by the California State Historic Preservation Officer to mitigate the adverse effects that would result from construction of the transmission lines.

- The western alternative routes were chosen to avoid cultural resources. This would be partially achieved by being west of the Lake Cahuilla shoreline. As a result, the potential for impacts to archaeological resources would be less along the western alternative routes than along the proposed routes. However, the transmission lines in the western routes would run along the U.S.-Mexico border for a greater distance, and the border itself is considered a cultural resource. These routes would have the potential to degrade the appearance of the border by introducing a visual intrusion. If these routes were selected, additional cultural resource surveys would be necessary as well as additional consultation with the California State Historic Preservation Officer and the appropriate Native American Tribes.

## ***Land Use***

- The proposed transmission line routes are within an area covered by the BLM's California Desert Conservation Area Plan. The transmission lines are consistent with the California Desert Conservation Area Plan to the extent that the lines are located within a designated utility corridor.
- The western or eastern alternative routes would require that portions of the transmission lines run parallel to the border. The U.S. Customs and Border Patrol Agency discourages practices of this sort because they would require additional patrolling to ensure the integrity of the lines.

## ***Visual Resources***

- The area in the vicinity of the transmission lines is classified as a Class III Visual Resource Inventory Area by the BLM. Visual Resources Management Class III objectives stipulate that the existing character of the landscape should be partially retained and that any level of change should be moderate. While landscape changes may attract attention, they should not dominate the view of casual observers.
- Construction and operation of the transmission lines would meet the visual contrast criteria established under the objectives for Visual Resources Management Class III, whereby the existing character of the landscape would be partially retained, with any level of change being moderate. The project would attract attention to viewers in the area, but it would not dominate views. The existing character of the landscape would be partially retained because the proposed transmission lines would parallel the existing SDG&E line and would use

lattice tower structures that allow natural light and background elements to show through.

- There are no residences and little recreational activity within the area of the projects. The most significant visual impacts of the transmission lines would occur to drivers along State Route 98. State Route 98 is neither an Eligible nor Officially Designated State Scenic Highway. A number of measures might be used to mitigate the visual impacts of the lines on people traveling along State Route 98, including the use of low-reflective metal surfaces on transmission towers or the treatment of these surfaces to allow blending with prominent desert background colors.